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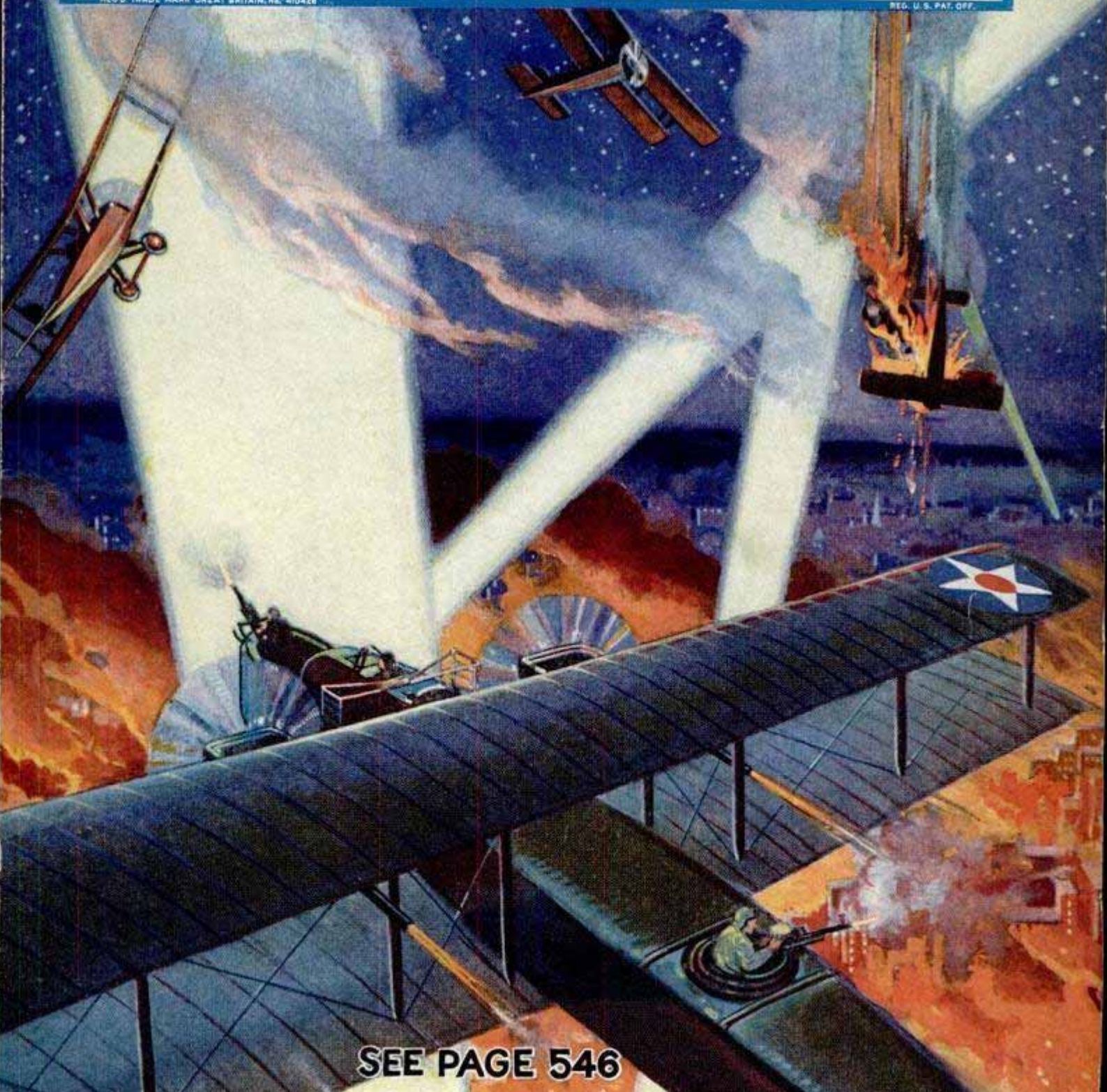
# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT

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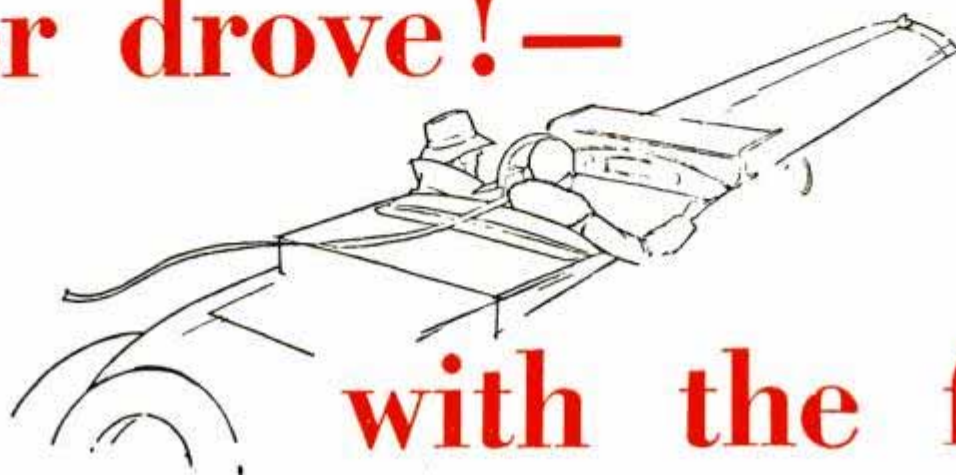
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SEE PAGE 546



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**with the first-  
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We announce the New Mobiloil—an oil so startling in its performance that the superlative statements we are ready to make about it are actually conservative.

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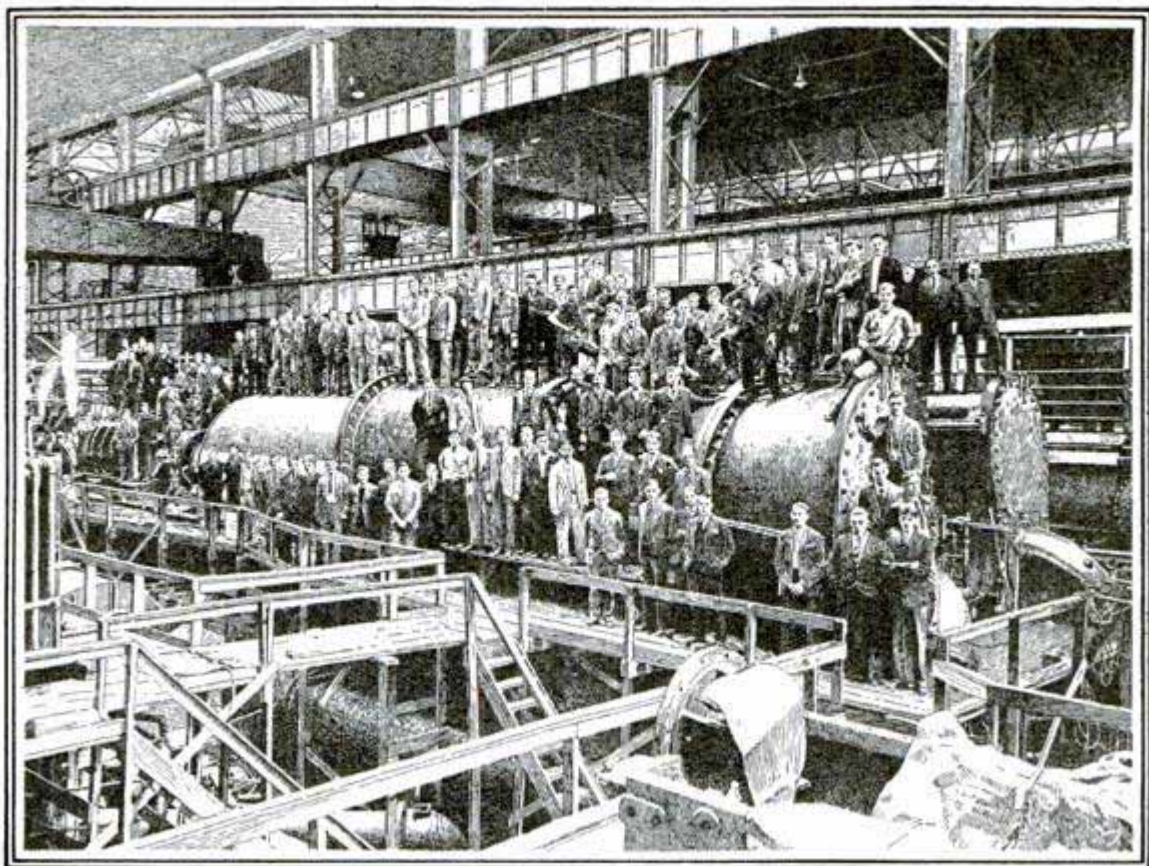
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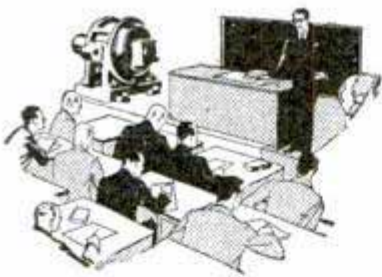


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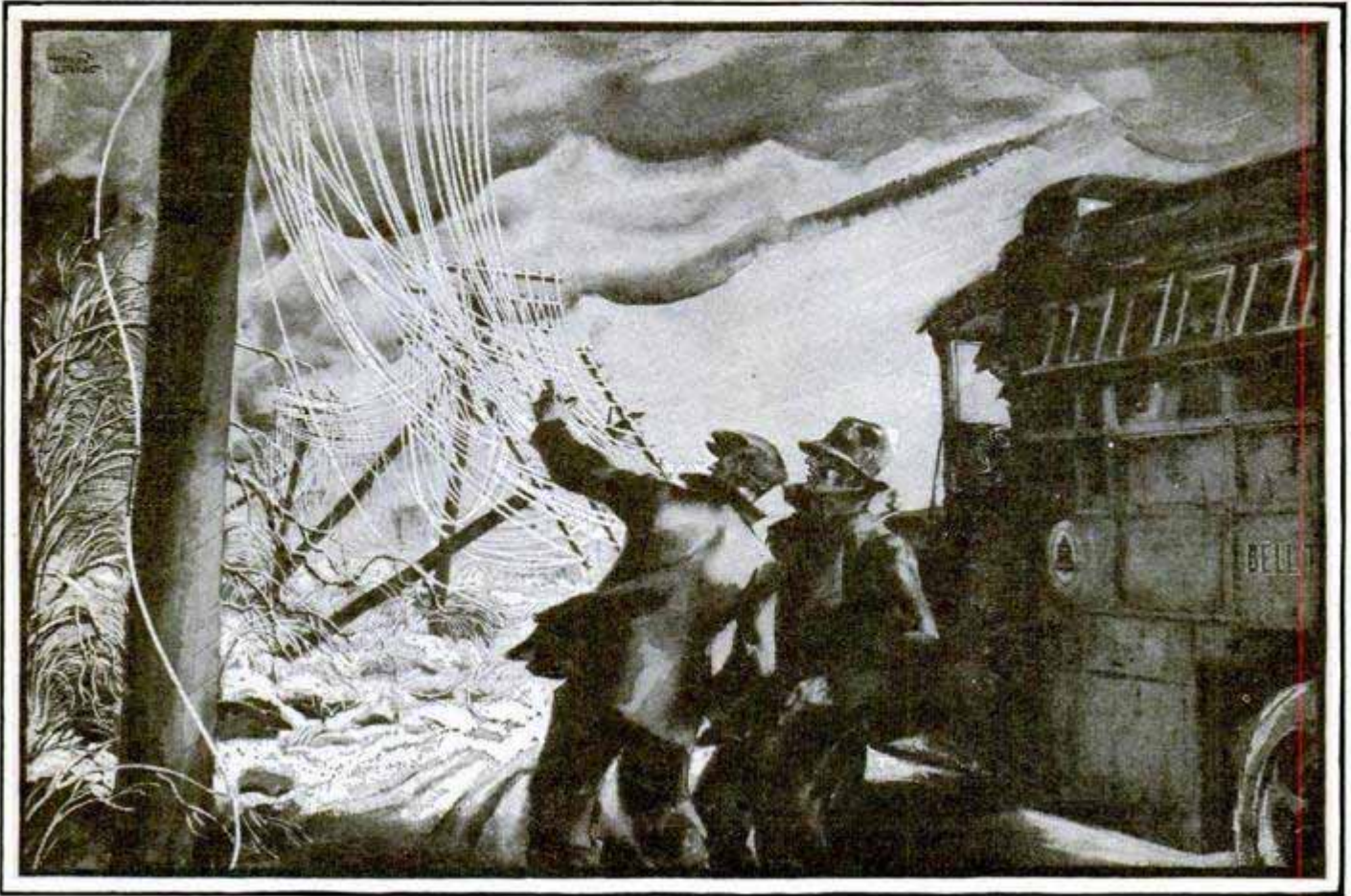
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*An Advertisement of the  
American Telephone and Telegraph Company*

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Within 72 hours the isolated exchanges



were connected and the 11,000 telephones back in service. Then, while the temporary construction carried on, neighboring Bell System warehouses poured out all needed equipment, new poles were set, new crossarms placed and new wire and cable run.

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London: Hachette & Cie.,  
16-17 King William Street, Charing Cross, W. C. 2

Paris: Hachette & Cie.,  
111 Rue Reaumur

Melbourne: Gordon & Gotch  
509-513 Little Collins St.

## ISSUED MONTHLY

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Entered as Second Class Matter Sept. 15, 1903, at the Post Office at Chicago, Illinois, under Act of March 3rd, 1879.

Entered as Second Class Matter at the Post Office Department, Canada.

Published monthly by POPULAR MECHANICS CO.

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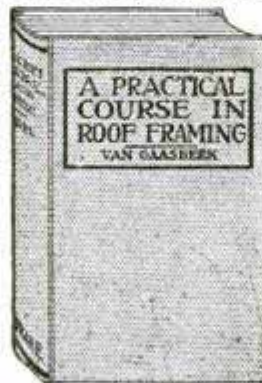
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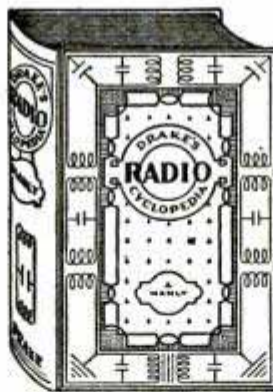
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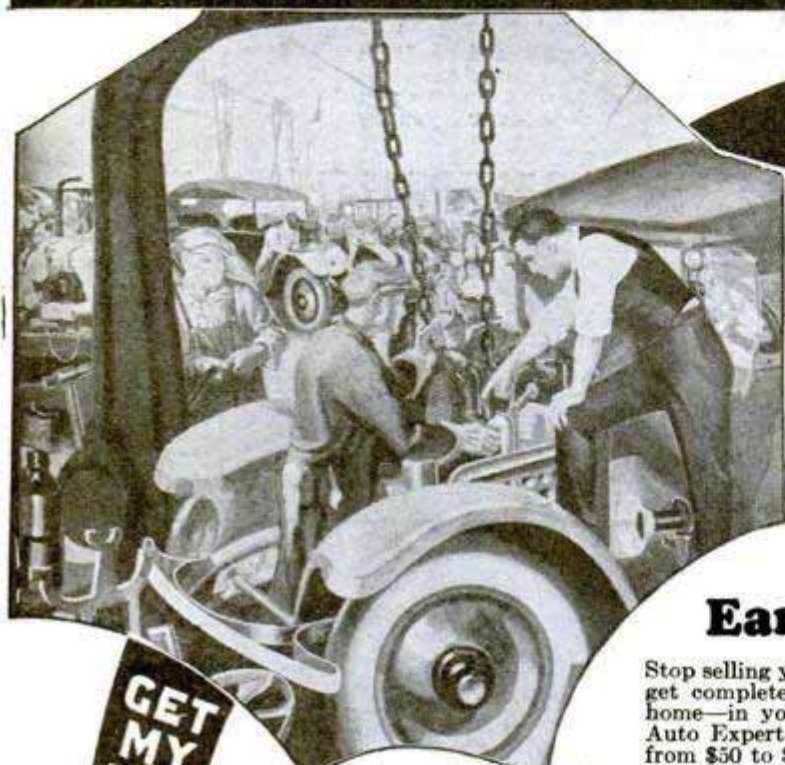
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Suppose your employer notified you tomorrow that he didn't need you any longer? Have you any idea where you could get another position?

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At least find out how, by marking and mailing the coupon printed below. There's no cost or obligation, and it takes only a moment of your time, but it may be the means of changing your whole life.

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# Do Unseen Hands Keep You Dumb.. *When You Ought to Talk?*



How often have you wanted to talk, but held back, silent, because you felt unequal to the other people present? How many times have you passed up, or avoided the chance to talk in public—before your business associates, your club or lodge, because of your fear of stage fright? Are you afraid of your own voice—instead of being able to use it as one of the greatest business and social assets in your possession? And yet you might be surprised to hear that many of the most brilliant public speakers we have today felt exactly this way—before they learned how to develop their "hidden knack" of powerful speech—a knack which authorities say seven men out of every ten actually possess. And the chances are that you, too, have in you the power of effective speech—which, if unloosed, would be almost priceless to you in a social or business way. Find out if you have this natural gift—read every word of the message below.

## Discover These Easy Secrets of Effective Speech

**P**ROBABLY you have never pictured yourself being able to sweep a giant audience off its feet—to win the applause of thousands. Yet, the men who are doing such things know that it is all astonishingly easy once you are in possession of the simple rules of effective speech. Before you learn these secrets you may be appalled at the thought of even addressing a small audience. Still it all seems so ridiculously easy when you know how to banish stage fright, and exactly what to do and say to hold an audience of one or a thousand in the palm of your hand.

Yet what a change is brought about when a man learns to dominate others by the power of effective speech! Usually it means a quick increase in earnings. It means social popularity. You yourself know how the men who are interesting talkers seem to attract whomever they wish and name their own friends—men and women alike.

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How to address business meetings.  
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How to tell entertaining stories.  
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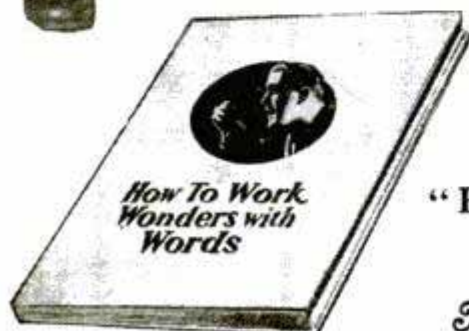
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Over \$600,000,000 is being spent yearly for sets, supplies, service. You can get your share of this business and, at the same time, fit yourself for the big-pay opportunities in Radio by joining the Association.

## Join the Radio Association of America

A membership in the Association offers you the easiest way into Radio. It will enable you to earn \$3.00 an hour upwards in your spare time—train you to install, repair and build all kinds of sets—start you in business without capital or finance an invention—train you for the \$3,000 to \$10,000 big-pay radio positions—help secure a better position at bigger pay for you. A

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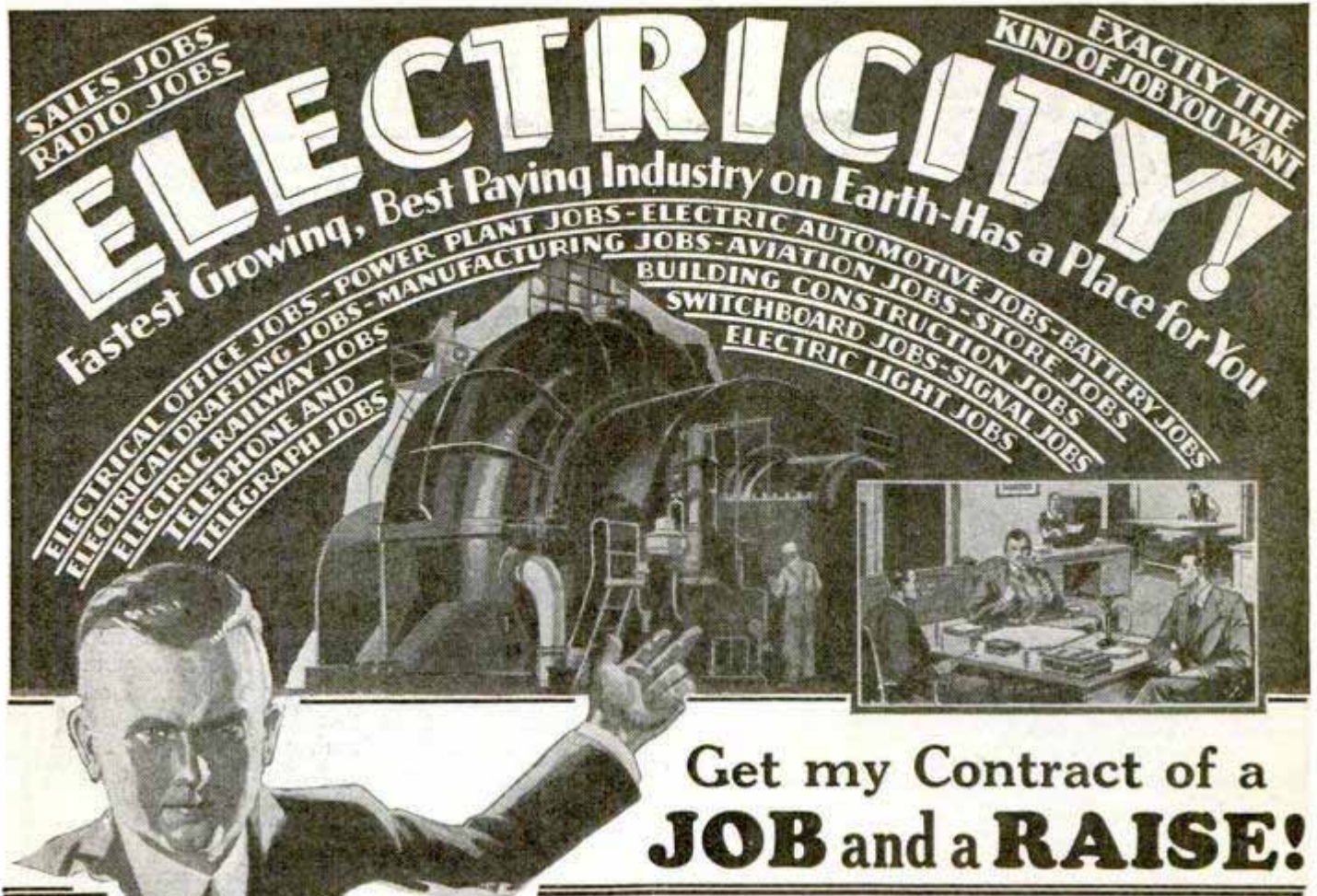
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Send for our agreement to take you as you are, supply you with the Electrical training you need, and then help you get a fine Electrical position at a substantial increase in salary, or no cost. You may wonder how this is possible. But the explanation is really simple: The Electrical industries are growing so rapidly that the supply of trained men cannot keep up with the demand. There are more good jobs open, always, than men capable of filling them. We are in close touch with many big employers and they tell us they can place all the trained men we can supply.

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This is *not* a fish story. It's a fact! When I say I can add one whole inch of real live muscle to each of your arms and two whole inches of the same wonderful strength across your chest, in just 7½ hours, I mean just that.

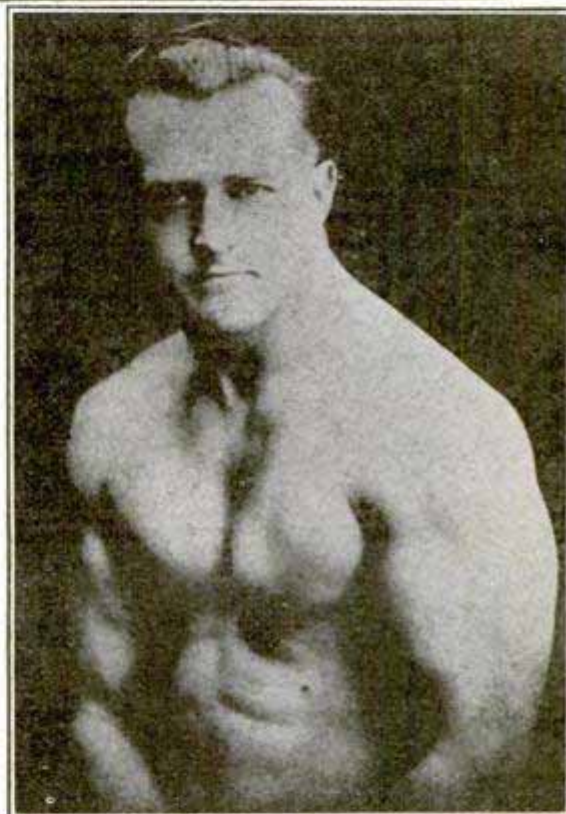
But I don't stop there. I do things with your body that even you never dreamed of. My business is to build muscle, and the health and strength that always come with muscle. In the past 19 years I've taken over 200,000 puny little underdeveloped bodies—coaxed them along—worked on them—filled them with new life—new hope—new terrifying strength that turned their owners into powerful, fighting, proud he-men. And how simple it all is under my instruction!

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All I ask of you is 7½ hours of your spare time, divided into 15 minute periods for 30 consecutive days. In those 15 minute periods you are to do exactly as I advise, using the apparatus I send you. At the end of the 7½ hours step before your mirror, and marvel at the transformation.

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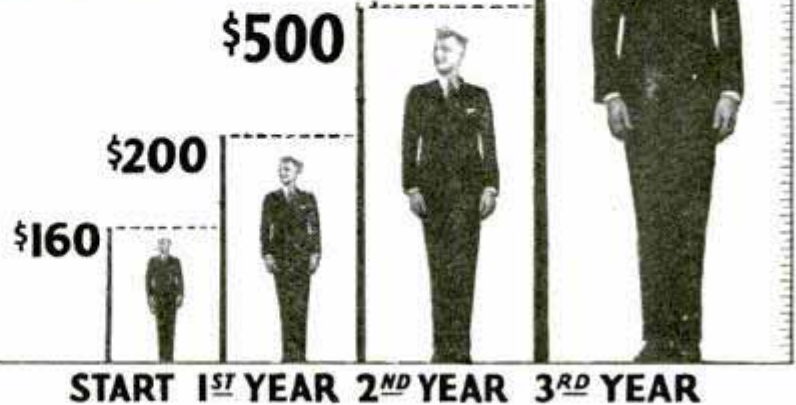
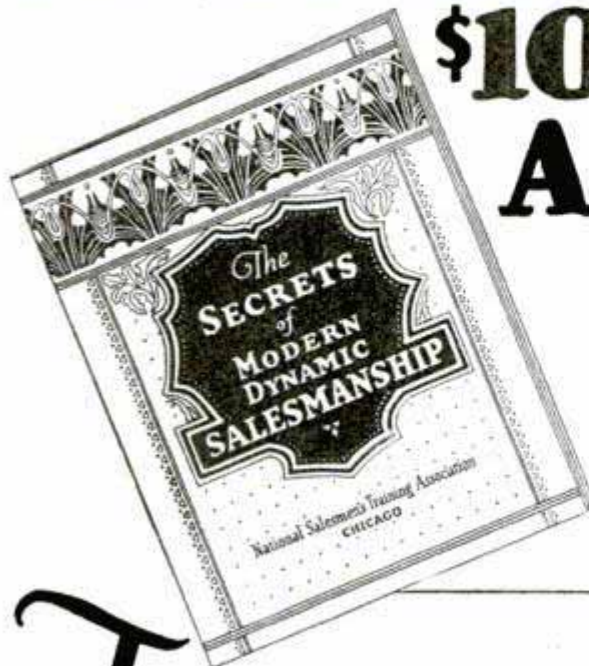
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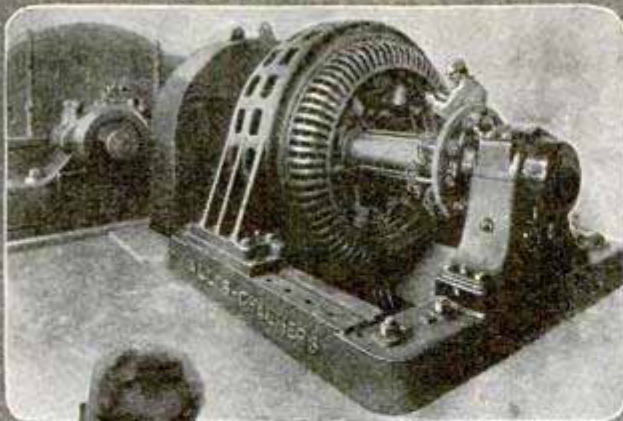
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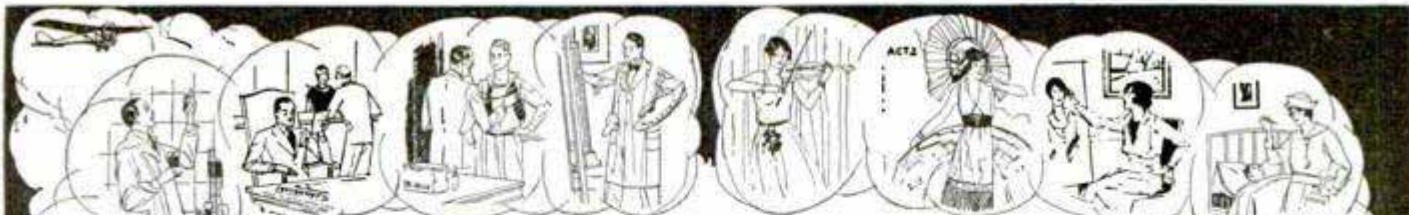
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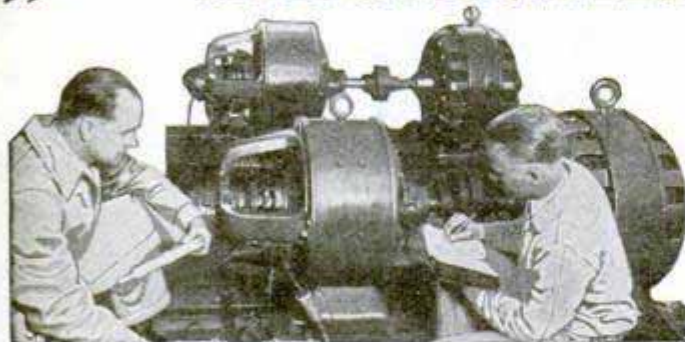
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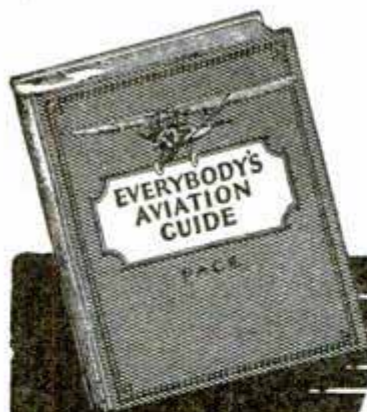
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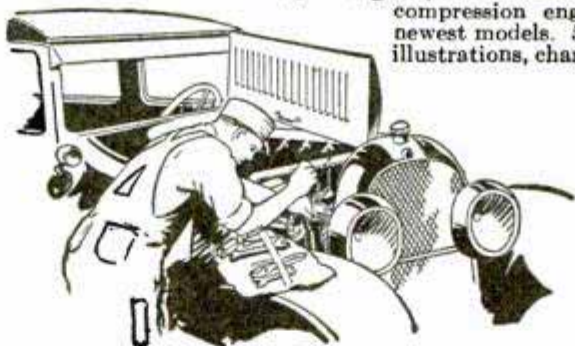
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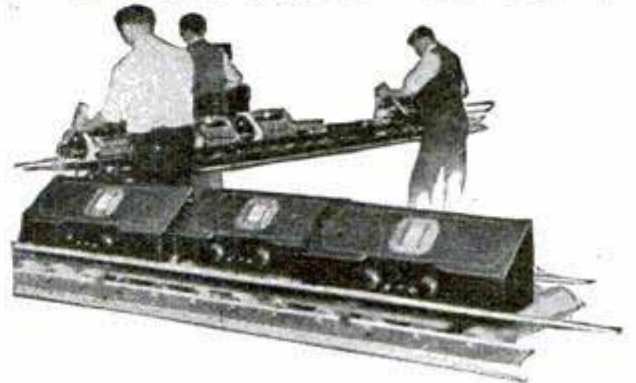
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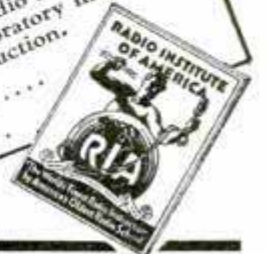
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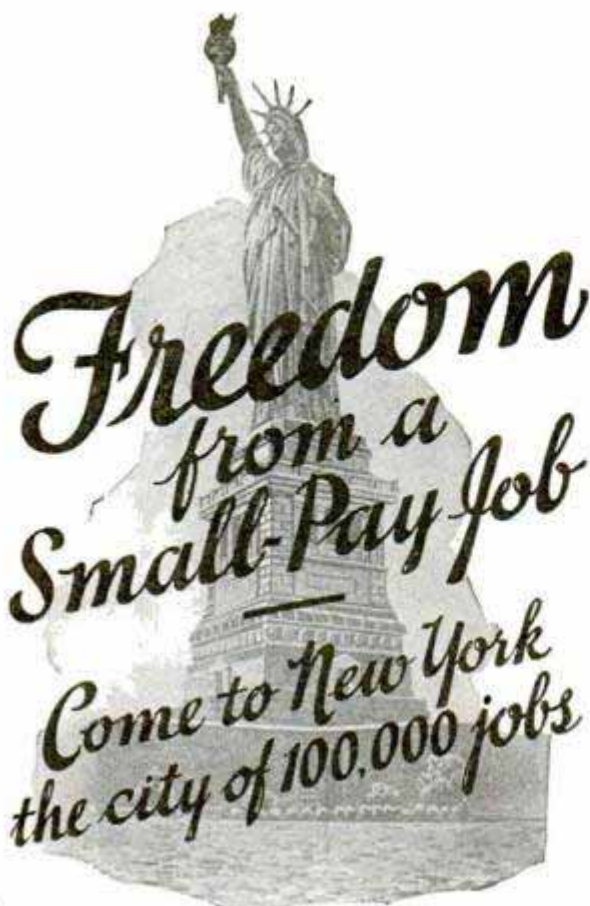
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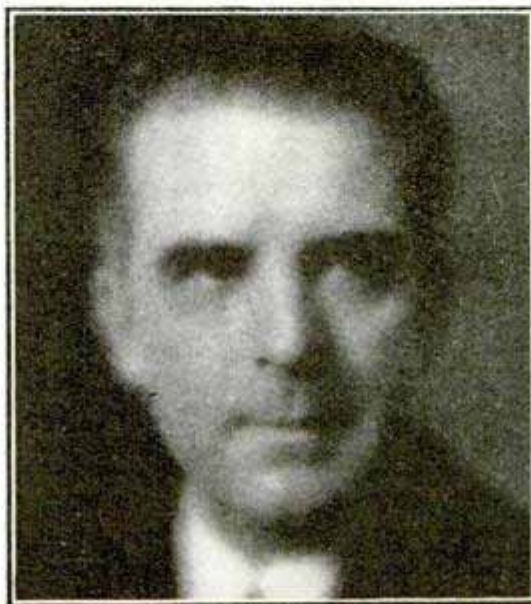
Some people believe I was lucky. Others think I am brilliant. But the sort of luck I had everyone can have. My type of brilliance is that of any average man.

Almost any \$40-a-week wage earner has as complete a mental equipment as I had two years ago. And he feels today just about the way I did then. For two years ago I too was in the \$40-a-week rut. My earnings were \$2,080 per year!

I was discontented, unhappy. I was not getting ahead. There didn't seem to be much hope in the future. I wanted to earn more money—a lot more money. I wanted to wear better clothes and have a car, and travel. I wanted to be on a par with people I then looked up to. I wanted to feel equal to them mentally and financially.

But it all seemed hopeless. I was beset with fears. I was afraid of losing my job. I was afraid of the future. I could see nothing ahead for myself and my wife and baby but a hard struggle. I would live and work and die—just one of the millions who slaved their lives away. I was irritable, easily annoyed, discouraged, "sore" at my fate and at the world. I could not think clearly. My mind was in a constant whirl. I was "scatterbrained." I had a thousand half-baked ideas to make more money but acted on none of them.

The end of each year found me in about the same position as the beginning. The tiny increases in salary, grudgingly given to me, were just about enough to meet the rising cost of living. Rent was higher; clothes cost more; food was more expensive. It was absolutely necessary for me to earn more money. So once in a while I got a few dollars more. But



it wasn't because of any great change in my ability.

Today I have an income of \$20,000 a year. That's exactly \$17,920 more than it was two years ago. A difference of \$35,840 in two years. My family has everything it needs for its comfort and pleasure. My bank account is growing rapidly. I have my own home in the suburbs. I am respected by my neighbors, and I have won my wife and children's love as only the comforts and pleasures of life can do. When I am old I will not be a millstone around anyone's neck. My children will not have to support me.

I look forward to the future with confidence and without fear. I know that only improvement can come with the years. Once I wandered through life aimlessly, cringing, afraid. Today I have a definite goal and the will to reach it. I know I cannot be beaten. Once my discontent resulted in wishes. Today my slightest discontent results in action. Once I looked forward hopefully to a \$5 a week increase in salary. Today I look forward confidently to a \$100 a week increase in my earnings.

What magic was it that caused the change in my circumstances? How did I, a \$40-a-week clerk, change my whole life so remarkably? I can give you the answer in one word—Pelmanism. I gambled 2c on it. Yet without it, I

might have continued in my old \$40-a-week rut for the rest of my life.

Pelmanism taught me how to think straight and true. It crystallized my scattered ideas. It focussed my aim on one thing. It gave me the will power to carry out my ideas. It dispelled my fears. It improved my memory. It taught me how to concentrate—how to observe keenly. Initiative, resourcefulness, organizing ability, forcefulness were a natural result. I stopped putting things off. Inertia disappeared. Mind-wandering and indecision were things of the past. With new allies on my side and old enemies beaten, there was nothing to hold me back.

I am writing this in appreciation of what Pelmanism did for me. I want other average men to gamble 2c as I did. For the cost of a postage stamp I sent for the booklet about Pelmanism, called "Scientific Mind Training." Reading that free book started me on my climb. I took no risk when I enrolled for the Course because of the Institute's guarantee. All I gambled was 2c and I am \$36,000 better off now than I would have been had I not written for the book about Pelmanism.

\* \* \* \* \*

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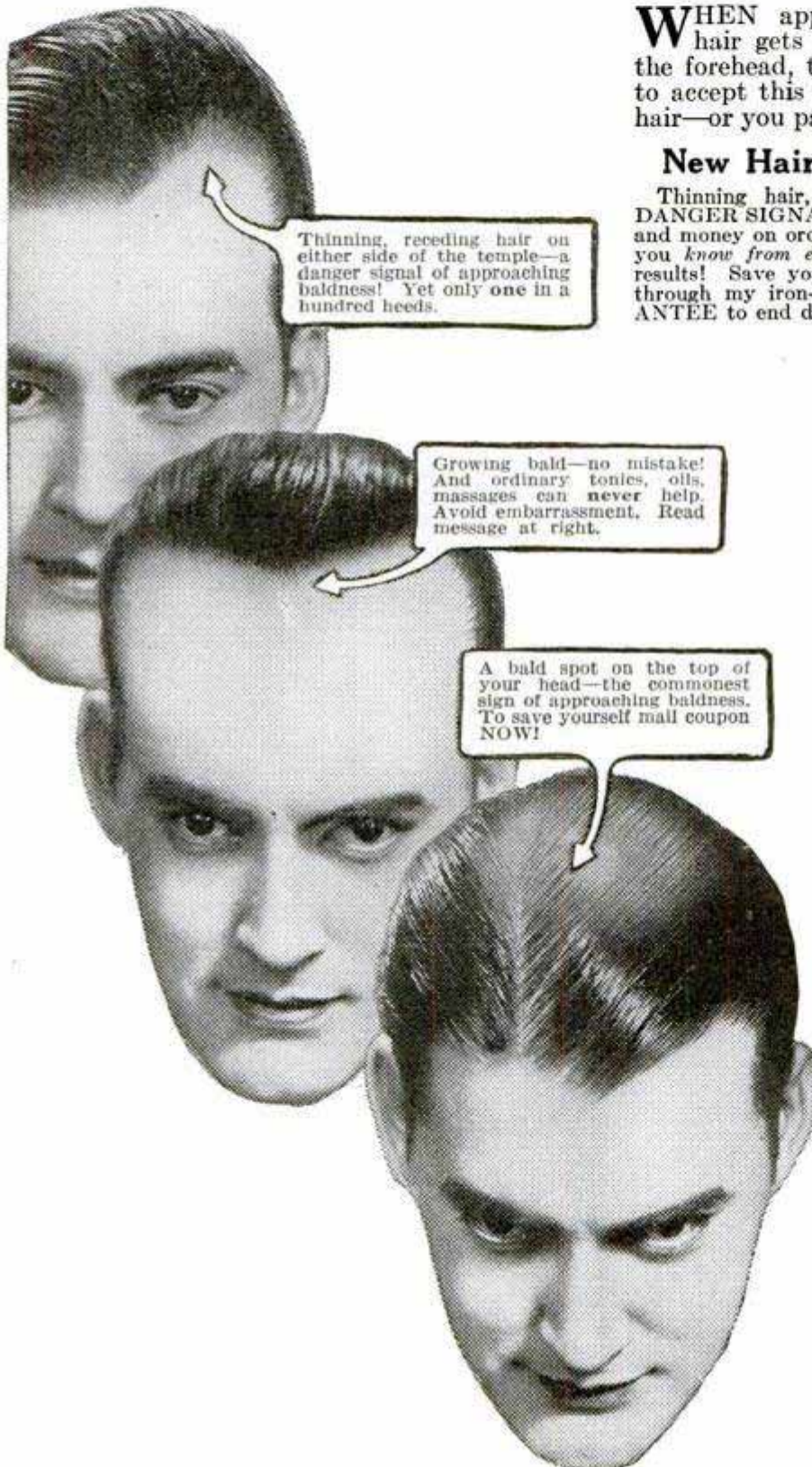
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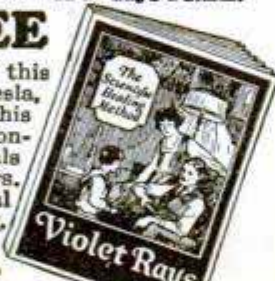
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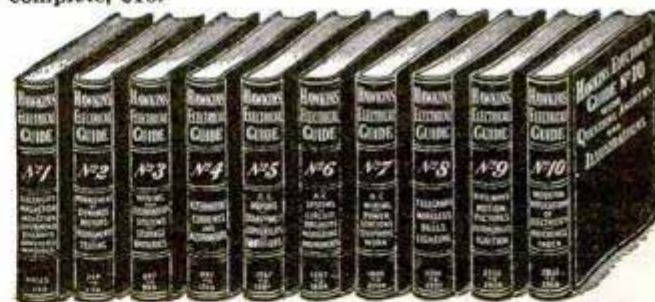
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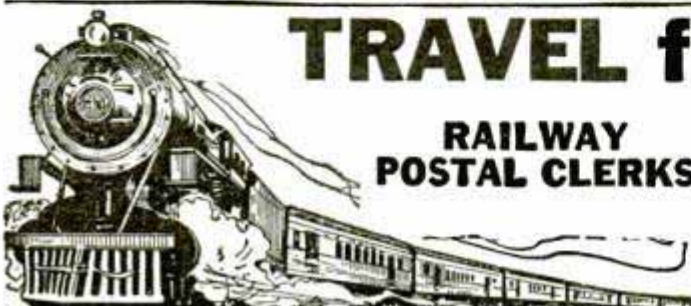
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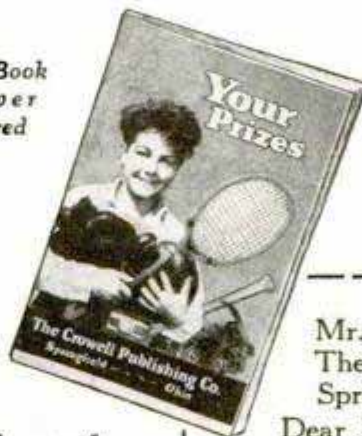
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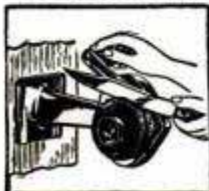
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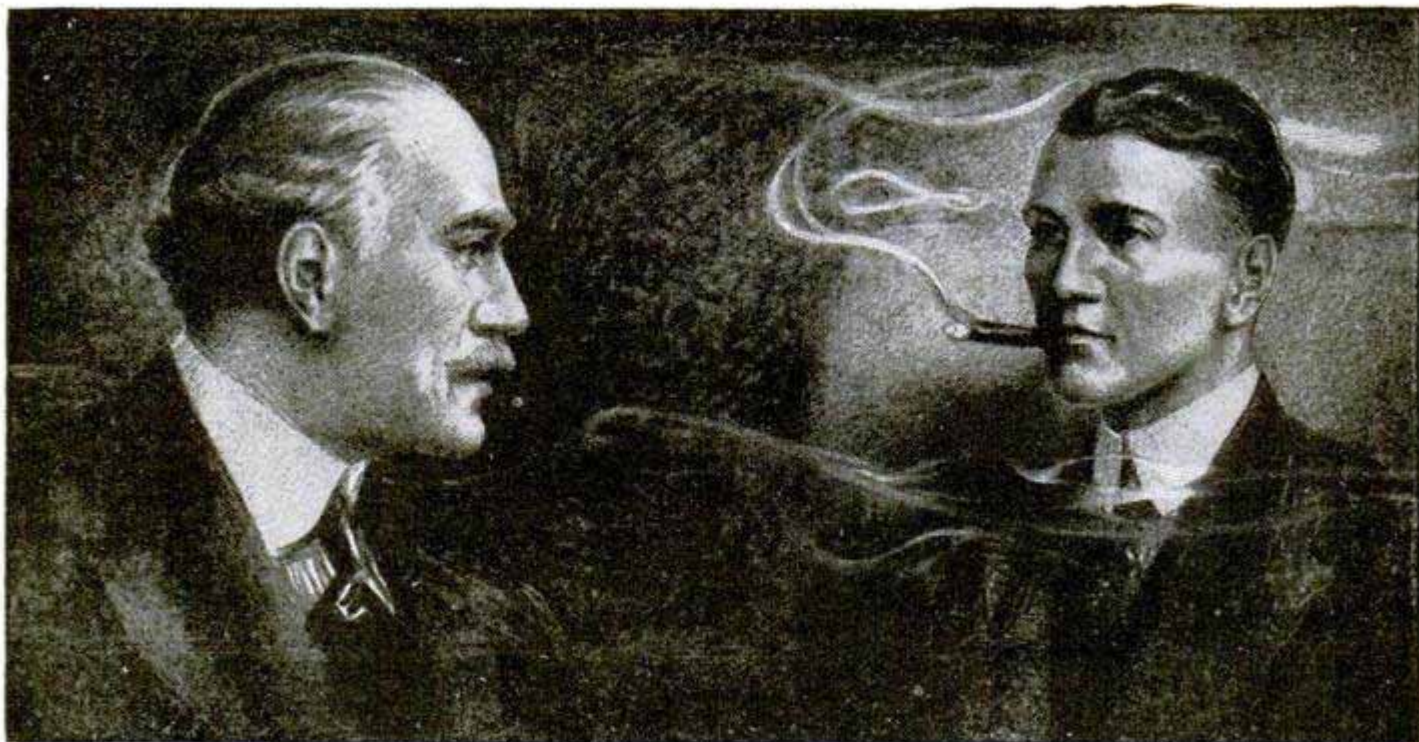
Name.....

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Town.....State.....

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Look at the facts square in the face, Mr. Tobacco User. You may think tobacco is not hurting you.

That is because you haven't as yet, perhaps, felt the effects of the nicotine poison in YOUR system. For you know that nicotine, as absorbed into the system through smoking and chewing tobacco, is a slow working poison. Slow, yes—but **sure**.

Tobacco is lowering your efficiency. It slows a man down. Makes it harder for you to concentrate your mind on your work. You haven't near the amount of "pep" and energy you would have if you stopped using it. There's many a man twice as old as you in years who's twice as young in energy, simply because he lets tobacco alone.

Some day you will realize to what an alarming extent tobacco has undermined your system.

When your hands begin to tremble—  
and your appetite begins to fail—  
and your heart seems to "skip a beat" now and then—  
and slight exertion makes you short of breath—  
then you have a right to suspect that  
**TOBACCO** is getting the upper hand.

Any well-informed doctor will tell you that these are only a few of many symptoms of tobacco poisoning.

And YOU know that the use of tobacco in any form is an expensive, utterly useless habit. You know you ought to quit.

## Tobacco Habit Banished Let Us Help You

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it—whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—**Tobacco Redeemer** will positively remove all craving for tobacco in any form in a very few days. Not the slightest shock to the nervous system. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

**Tobacco Redeemer** contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

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Man, you won't get anywhere without health!

Businessmen and industrial leaders everywhere are insisting upon health in their employees. Not only do they realize that success in business and industry today depends upon the steadiness, sobriety and daily energy of their workers in their enterprises, but businessmen like to have energetic, healthy, fresh looking, vital workers around them—from the office boy to the old janitor. They won't stand for lazy, anaemic, pimple-faced, half-alive, sickly, complaining assistants. Such weaklings lack push and staying power. These laggards are off sick with colds, headaches and bellyaches of all kinds, all too many days. Employers realize they can never promote a business to great success with such employees.

## Weakness Brings Failure

You can't win success when you are ailing and complaining. You will be a drawback to business. If you go on "the road" selling goods you become a broadcaster of "hard times" and "slow business"—you spread pessimism wherever you go. You chase away orders, where a healthy, good looking, cheerful chap would bring in business.

If you are a sickly, sissy weakling you repel trade—women shrink from you; men despise you. If you are alert, athletic looking, ruddy-complexioned, eager to serve, you will sell goods without half trying and thus make yourself invaluable to your employer—you win success and promotion.

In the shop, where energy, muscle and everyday service is required to speed-up production, the fellows who exhibit brawn, energy and stamina are the men that are hired and never fired.

So it is all along the line—no getting away from it. Health is necessary to success. Health pays.

## Leading Employers Demand Healthy Employees

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THOMAS A. EDISON, INC., Orange, N. J., say: "We make good health an essential requirement for a position."

THE ATWATER KENT MFG. CO., Philadelphia, say: "An employee who is careful of his health is more efficient than one retarded by the handicap of an unsound body."

THE PENNSYLVANIA RAILROAD CO., Philadelphia, writes: "It is the policy of this company to have applicants for employment undergo a physical examination."

THE ARMSTRONG CORK CO., Lancaster, Pa., writes: "Good health is given almost first importance in selecting our employees."

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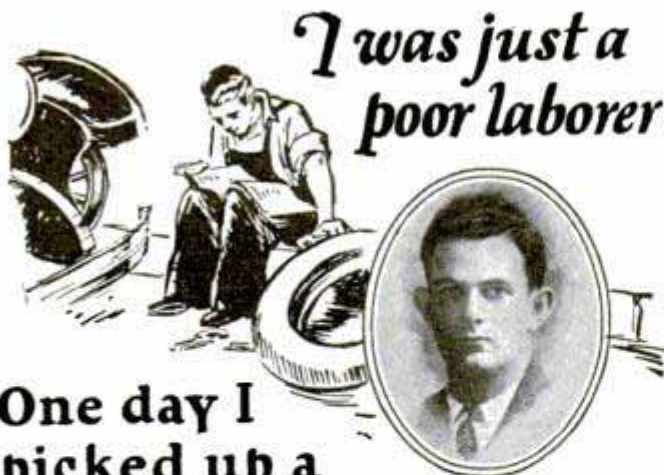
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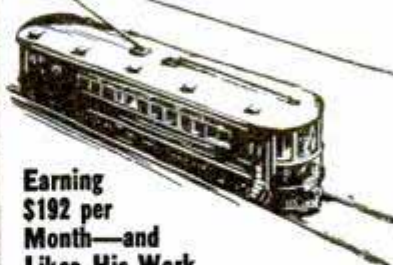
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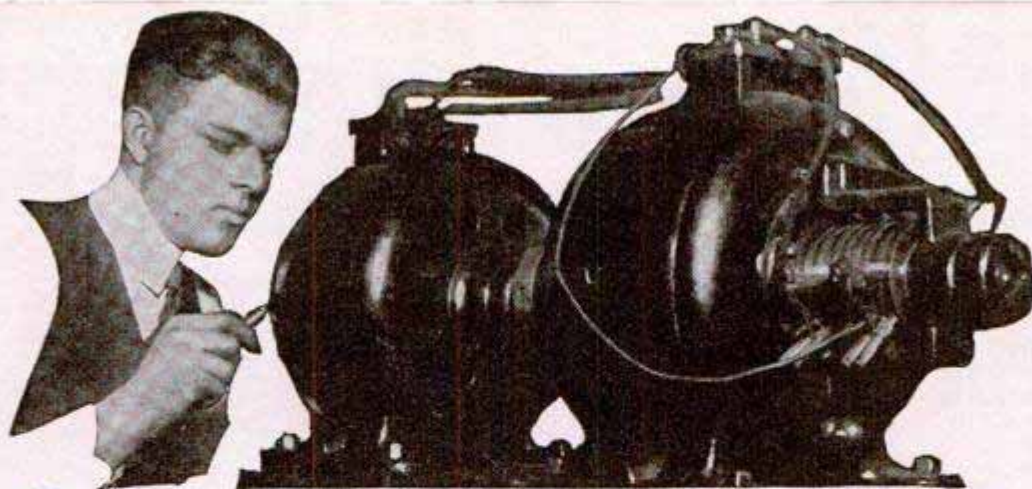
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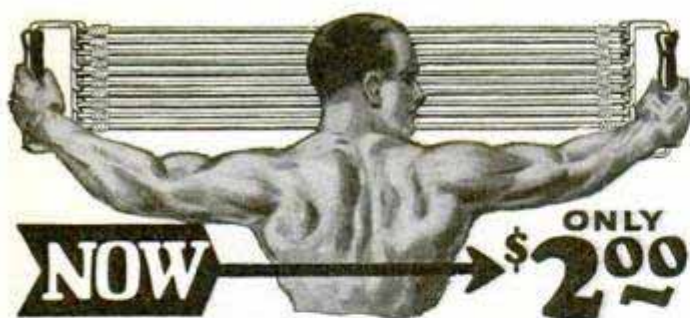
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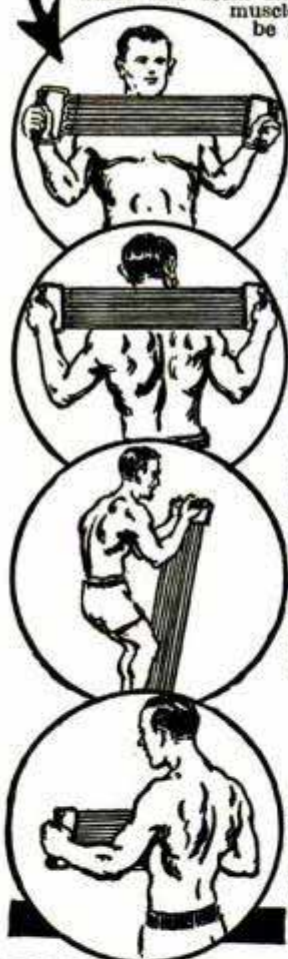
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A WONDERFUL business, you will say, to make men trained for other fields, give them up for Radio. Yes, but they had their eyes wide open. They know what you and I know—that big growth makes big jobs and many opportunities to earn big money. Heffelfinger, Jones, and Butler couldn't make anything like this money before, although they probably worked just as hard—maybe harder. Trained men are needed for the big jobs the amazing growth of Radio is creating.

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WHY go along at \$25, \$30, \$35 a week when the good Radio jobs pay \$50 to \$250 a week? Cut loose from drudgery, small pay, no-future jobs. Get into a live-wire field that offers you a real chance. You don't need a high school or college education to become a Radio Expert. Many of my most successful graduates didn't finish the grades.

## Practical Experience With Course

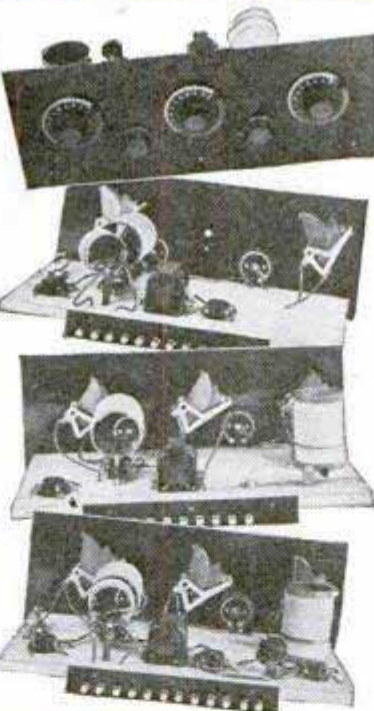
I GIVE you six big outfits of Radio parts. With them you can build and experiment with one hundred different circuits—learn the "how" and "why" of practically every type of set made. This makes learning easy, interesting, fascinating, your training complete. Nothing else equals my method.

## TELEVISION also Included

YOUR knowledge of Radio will be right up to the minute with Radio's progress and inventions when you take my training. Television, the new field for Radio experts, is included. Not one system for sending and receiving pictures by Radio, but all of them—Jenkin's, Cooley's, Bell's, Baird's, Belin's, Alexanderson's.

Television can easily and quickly become as large as the whole Radio industry is today. Broadcasting stations will soon need trained men, so will manufacturers for the designing and building of sending and receiving sets. It won't wait for you. Get ready quick.

**I GIVE YOU THE RADIO PARTS FOR A HOME EXPERIMENTAL LABORATORY**



**WITH THEM YOU CAN BUILD 100 CIRCUITS. 4 YOU BUILD ARE SHOWN HERE. MY BOOK EXPLAINS THIS PRACTICAL FASCINATING WAY OF LEARNING RADIO**

*Get a copy Free*

## I Will Train You at Home in Your Spare Time

NO NEED to leave home. Hold your job, give me one-half to one hour a day of your spare time. In six to twelve months you can be a trained Radio Man, ready to step into a new job with a real future.

**\$10 to \$30 a Week While Learning**  
MANY of my students make \$10, \$20, \$30 a week extra while learning. I teach you to begin making money shortly after you enroll. G. W. Page, 1807 21st St., Nashville, Tenn., made \$935 in his spare time.

**Money Back If Not Satisfied**  
I KNOW the kind of training you need. I have put hundreds of men and young men ahead. I am so sure that I can satisfy you too that I will agree to refund your money if you are not satisfied when you complete my course.

**Find Out What Radio Offers You**  
MY 64-page book explaining where the big jobs are and what you can make is FREE. Mail coupon. No obligation. Address: Dept. 9QP J. E. Smith, Pres., Nat'l Radio Institute, Washington, D. C.



## Send this Coupon

J. E. Smith, President,  
Dept. 9QP, National Radio Institute,  
Washington, D. C.  
Dear Mr. Smith:—Send me your book. I want to know about the opportunities in Radio and your practical method of teaching at home with six big outfits of Radio parts. This request does not obligate me to enroll.

Name ..... Age .....  
Address .....  
City ..... State .....

**THIS IS RADIO'S BIGGEST YEAR**





## High School Course in Two Years!

### You Want to Earn Big Money!

And you will not be satisfied unless you earn steady promotion. But are you prepared for the job ahead of you? Do you measure up to the standard that insures success? For a more responsible position a fairly good education is necessary. To write a sensible business letter, to prepare estimates, to figure cost and to compute interest, you must have a certain amount of preparation. All this you must be able to do before you will earn promotion. Many business houses hire no men whose general knowledge is not equal to a high school course. Why? Because big business refuses to burden itself with men who are barred from promotion by the lack of elementary education.

### Can You Qualify for a Better Position

We have a plan whereby you can. We can give you a complete but simplified high school course in two years, giving you all the essentials that form the foundation of practical business. It will prepare you to hold your own where competition is keen and exacting. Do not doubt your ability, but make up your mind to it and you will soon have the requirements that will bring you success and big money. **YOU CAN DO IT.**

Let us show you how to get on the road to success. It will not cost you a single working hour. Write today. It costs you nothing but a stamp.

### American School

Dept. H-474 Drexel Ave. and 58th St., Chicago

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Send me full information on the subject checked and how you will help me win success.

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| ....Automobile Repairman    | ....Mechanical Engineer   |
| ....Civil Engineer          | ....Shop Superintendent   |
| ....Structural Engineer     | ....Employment Manager    |
| ....Business Manager        | ....Steam Engineer        |
| ....Cert. Public Accountant | ....Foremanship           |
| ....Accountant and Auditor  | ....Sanitary Engineer     |
| ....Bookkeeper              | ....Surveyor (& Mapping)  |
| ....Draftsman and Designer  | ....Telephone Engineer    |
| ....Electrical Engineer     | ....Telegraph Engineer    |
| ....Electric Light & Power  | ....High School Graduate  |
| ....General Education       | ....Wireless Radio        |
| ....Vocational Guidance     | ....Undecided             |

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Address .....

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A Big money-making opportunity is waiting for YOU right NOW—in your own back yard! Thousands of my students are cashing in BIG, the way you can—in part or full time. Start with a small flock—small investment, and make a good profit. Eggs and poultry meat are in big demand at high prices. I'll PROVE that I can put YOU among the big money-makers QUICK!

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### FREE Book Shows Way to Success and BIG Profits

Mail coupon below TODAY for my Big NEW FREE Book, "How to Raise Poultry for Profit." My forty years of experience are yours. The Poultry Industry needs YOU. You need my book. Get it—and get in line for the BIG Money that's waiting for you in POULTRY.



## Mail NOW for FREE Book

**NATIONAL POULTRY INSTITUTE**, Dept. 411-H Washington, D. C., Attn: Harry M. Lamon, Pres.

Dear Mr. Lamon: Send me your **FREE** Book, "How to Raise Poultry for Profit." I want to know more about my opportunity to make \$1000 to \$5000 a year, spare or full time.

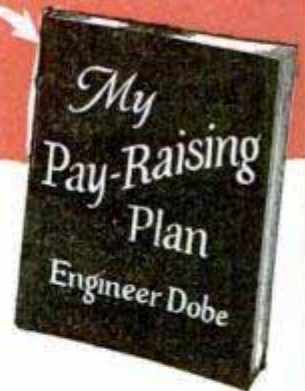
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Address.....



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## NEW Helpful Pay-Raising Plan



**Draw This JACK**  
any size you wish



and

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**Hurry!**

Send me copy of Jack. I want to see what kind of a Draftsman you will make. Copy it quick and I'll send you the Draftsman's Pocket Rule, free, right away.

Write to me. I will send you this new book. Not a catalog. My Pay-Raising Plan and Money-Making Advice. I can prove that John Savadge, trained by me, makes \$300 a month. Earl J. Dupree, trained by me, refused \$600 a month because he makes more in his own business. A. H. Bernier, trained by me, earns \$7000 to \$9000 a year. Arthur Dewalt, trained by me, makes more than \$400 a month. D. C. Stroop, trained by me, makes \$475 a month. L. V. Broughten, trained by me, makes \$300 a month.

Now is the time to learn to be a draftsman. Get Free, "My Pay-Raising Plan." Send for it at once. Read this advertisement clear through. See for yourself how you can make real money as a draftsman. Read how much work there is.

### I Train You at Home

My practical working method makes every step in learning drafting as clear as a moving picture. That's why I train you so fast to be a draftsman.

### Money Back If Not Satisfied

I train you under a positive Money-Back Agreement. If my training does not satisfy you after you have finished you get every penny back.



**You Get These Money-Making Tools**

These Drawing Instruments and 14 other Tools furnished with my Course.

### Earn While You Learn

You can start earning money a few weeks after beginning my training. I give you special work and tell you how to make money.

### Money-Making Tools Furnished

You get these fine quality, genuine, imported draftsman's tools, just as soon as you become my student. No finer tools made for practical drafting work.

### Employment Service

After training you I help you to get a job without charging you a cent for this service. Employers of draftsmen come to me for men because they know that men I train make good.

### Draftsmen Needed In:

#### Auto Work

The automobile industry is one of the greatest in America. Thousands of draftsmen needed. I'll train you for the work.

#### Electricity

Electricity is the coming motive force of the world. Draftsmen are needed in every department of this fascinating work. I'll train you at home. Get a job here.

#### Aviation

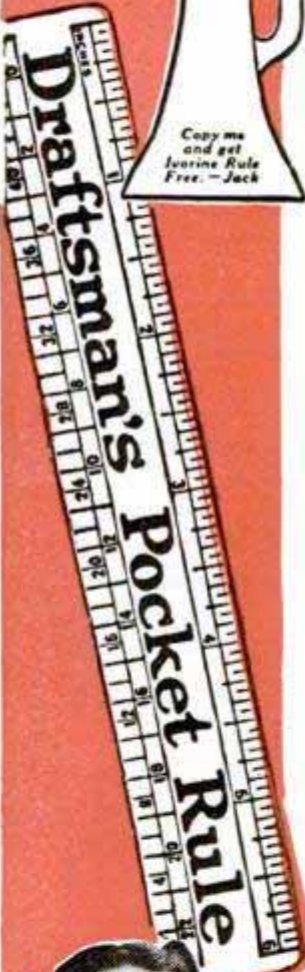
Aviation is just in its infancy. It is bound to expand to enormous proportions. Draftsmen are essential to it. I'll train you quick at home for drafting position.

#### Motor Bus Work

Motor bus building and motor bus transportation have become leading world industries. Hundreds of draftsmen engaged in this work. I'll show you the way.

#### Building Work

There will always be building. No structure can be erected without plans drawn by draftsmen. I'll make you an architectural draftsman.



**ACT NOW**

Before you put this Magazine Down let me send you "My Pay-Raising Plan". Remember Draftsmen are needed everywhere. That's the kind of profession to get into. Mail this coupon today.

**Engineer Dobe, 1951 Lawrence Avenue Div. 13-54 Chicago, Ill.**

### Age or Lack of Education No Drawback

You do not need previous experience. You do not need to be a high school graduate. My practical home study course gives you just the training needed to become a practical draftsman.

**If You Earn Less Than \$70 a Week Write Me Today!**

### Mail Coupon—Get Free Rule!

#### ENGINEER DOBE

1951 Lawrence Ave., Div. 13-54 Chicago

Send me free rule; also send me free of all cost "My Pay-Raising Plan"—how to earn money while learning and proof of big money paying positions in big industries right now.

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

Post Office \_\_\_\_\_ State \_\_\_\_\_

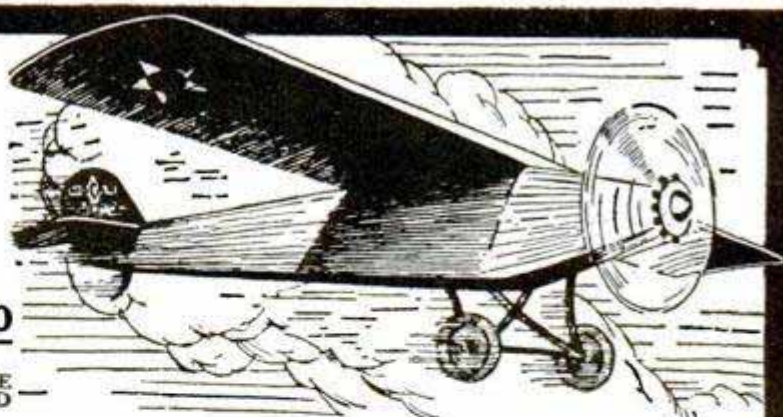


# The MOCAR MODEL AIRPLANES

## THAT FLY

SET NO. 1

\$1.50

COMPLETE  
POSTPAID

### From Hawaii

Mt. Carmel Mfg. Co.

Dear Sirs:

Yesterday was Aviation Club Day. We received our Construction Outfit (Set No. 1). In about an hour and a half I riveted the parts and covered the outside and everything. I took it out and flew it. It flew gracefully! I have already made many planes and racers, but never in my life have I gotten a plane that you could make so easily, so quickly and fly well. Think of it, an hour and a half since I started making it, it flew, and well too!

It is just the kind of plane that the airplane builders like, especially the "Green-Horns."

Yours very truly, KIGOSHI UZAWA

Schofield, Oahu, T. H.

and from  
the Schools

Sanborn, Iowa

Mt. Carmel Mfg. Co.

Dear Sirs:

Received the Mocar model airplane which I ordered from you some time ago. I find it highly satisfactory for classroom use.

Please send me nine more Mocar model airplanes for one of my classes.

JOE E. CUFFEL  
Instr. Manual Arts  
Sanborn, Iowa



## BOYS Don't miss the fun of making and flying a "MOCAR"

HERE IS THE GREATEST VALUE YOU'VE EVER SEEN  
—A GENUINE ALUMINUM MODEL AIRPLANE THAT  
REALLY FLIES, AT A SMALL PRICE

The "Mocar" monoplane—Set No. 1—is a copy of Lindbergh's famous Spirit of St. Louis. Wing spread 18 inches, fuselage 12 inches, powerful motor, special propeller, rubber tired disc wheels. Weight complete only about 2½ oz. This is a practical, simple, real model plane that gives you a whole lot of fun at a very moderate cost.

The all metal construction makes a sturdy plane that will stand a whole lot of abuse. The outfit is mounted on cardboard with all parts plainly marked and full instructions for assembly. Pliers only tool necessary.

Construction Set No. 1. Complete with rivets, bolts, wheels, wing and fuselage covering material, only \$1.50 postpaid (3 for \$4.00). Model L made up ready to fly \$2.25 (3 for \$6.00) postpaid.

Order now—or see your dealer

THE MOUNT CARMEL MFG. CO.  
Dept. M NEW HAVEN, CONN.

GREAT FUN, LEARN HOW TO MAKE AND FLY AIRPLANES

## BIG Demand for Skilled Mechanics!

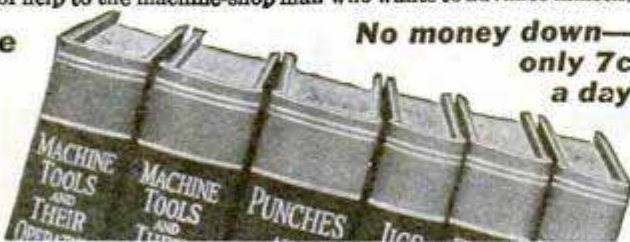
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We will furnish you without extra charge when you enroll any instrument you select and teach you to play it by our NEW copyrighted easy to learn home-study course. Thousands of men, women, boys and girls have learned to play by our simplified method. Cost is only a few cents a day. You pay while you learn. Instrument and first lesson sent on FREE trial. Write today.

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Old Way

Our Way

**Ideal Extension Shoe**  
for any person with one short limb. It costs less. No more unsightly cork soles, irons, etc. Worn with ready-made shoes. Write for booklet.

Robert M. Eisinger, 976 Lexington Ave., N. Y. C.

## Poor English!

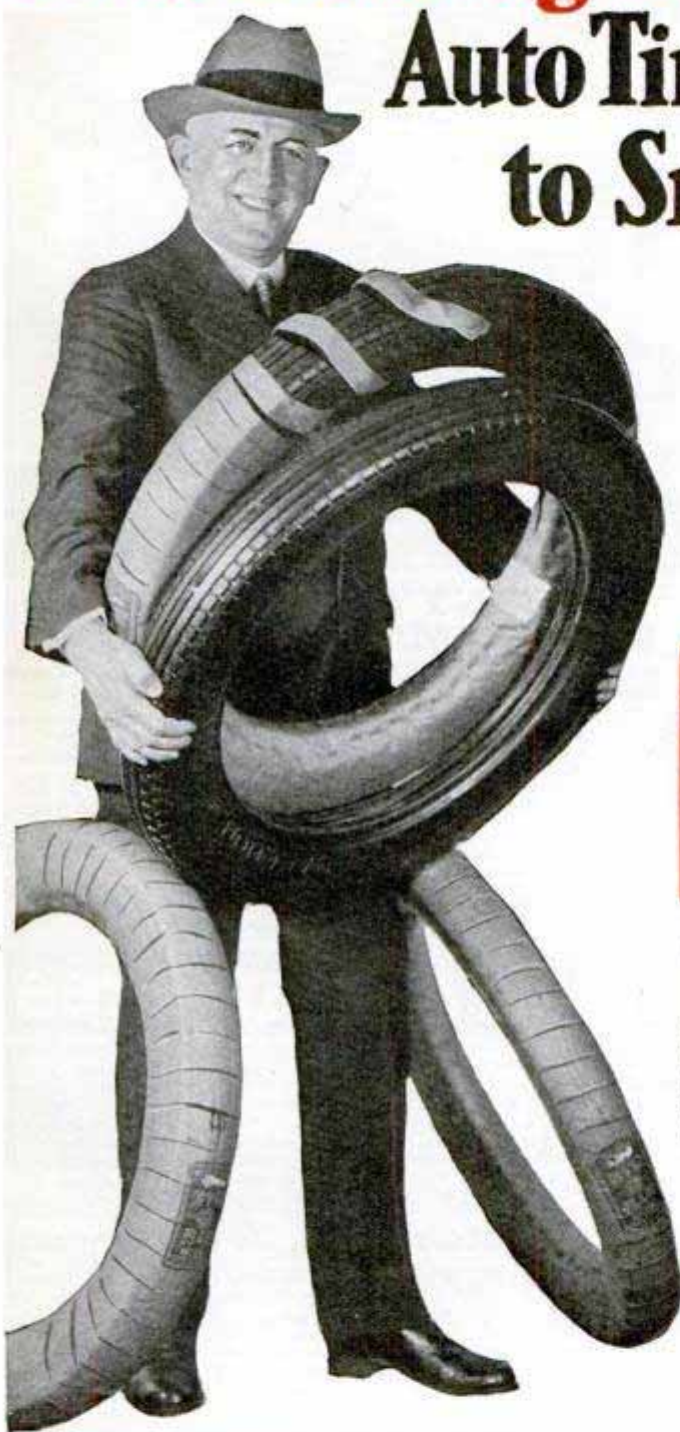
How much is it costing you  
in wasted opportunity?

Every day your associates are judging you—by what you say and how you say it! Hazy ideas, ill-chosen words, halting sentences, crude, slovenly speech—these mark a man as loose in thinking. Thoughts clear-cut, words that give true shape and color, sentences aflame with power and originality—these are the things that proclaim ability, that win for their users swift advancement. Stop apologizing for poor English—it's inexcusable! In the quiet of your home—with LaSalle's help—you can learn to speak and write with real distinction, learn to make the words you utter and the letters you compose stamp you as educated, cultured, a power to reckon with in the business world. Complete details in an attractive 32-page book, "Effective Business English," sent you free upon request. Ask for it TODAY.

LaSalle Extension University, Dept. 464-BE, Chicago



# This Amazing Guarantee Means— Auto Tires Free Every Year to Smart Car Owners!



**T**IRES and gasoline are the two big costs in running a car. You spend enough money for gasoline every year to buy yourself *three* sets of tires. I guarantee to cut your gasoline bill *one-third*. I offer you free proof you can increase your gasoline mileage so as to save enough to keep your car in tires. In just five minutes you can attach the famous Stransky Vaporizer to your motor. Hardly bigger than a silver dollar, but it should save you from \$60 to \$80 a year or more.

## World Wide Proof

Three million car owners have installed the Stransky Vaporizer on its merits. Thousands have reported amazing increases in gasoline mileage. F. S. Carroll got 40 miles per gallon from a Chevrolet. "Battling" Nelson, pugilist, increased his mileage to 33½ miles per gallon with a touring car and over 40 miles per gallon with a roadster. Virgil Barnes, big league pitcher, drove from New York to Holton, Kansas, and averaged over 40 miles per gallon.



## Cuts Gasoline Consumption 1/3, Free If It Fails

Fits any car in 5 minutes. Automatically supercharges gasoline with air. Get more power out of less fuel. Patented—can't be copied. Three million now installed. One of the most successful inventions in the history of the automobile.

## What Extra Mileage Means!

The amazing thing is that even if you cut your gasoline consumption only one-third—even if you increase your mileage to only 16 or 18 miles per gallon—you will save enough every 3000 miles of travel to buy yourself a new tire! That is what the Stransky 30 day guarantee means to you—free tires for the life of your car or the Vaporizer costs you nothing!

## Make This Test

Let me send you a Stransky Vaporizer on trial at my risk with the understanding that it costs nothing if it fails. Loosen one connection and insert the Vaporizer. Turn down the set screw on your carburetor as directed.

Check results. Compare the mileage you get with the mileage you used to get.

See for yourself how power, pickup and speed are noticeably increased. We give you 30 days to satisfy yourself—a full month. Then, if the Vaporizer is not saving you at least \$5 a month, why simply mail it back, and the trial costs absolutely nothing. No obligation—no argument—no questions asked.

Mail the coupon below for full details, guarantee, and amazing trial offer. This first step does not obligate you in any way whatever.

## Salesmen and Representatives Wanted—\$3 An Hour

Show the Stransky Vaporizer to car owners. Sells fast under test and guarantee. Foster made \$357 in 2 weeks. G. F. Fuller earned \$114 in 5 days. You should earn at least \$3 every hour you put in. Get demonstrating sample offer and full details. Simply check coupon.

## See What Increased Mileage Saves You!

Users of the Stransky Vaporizer have reported up to 40 miles on a gallon of gasoline. The saving in such cases is enormous. The following outline is based on an average of 12 miles per gallon and an average saving of only one-third.

### Without Vaporizer

Miles per month (avg.) 900 miles  
Divided by miles per gal. 12 miles  
Equals gals. per month 75 gals.  
Multiplied by the cost  
per gal. .... 20c  
Equals cost per mo. \$15.00

### With Vaporizer

Miles per month. .... 900 miles  
Divided by miles per gal. 18 miles  
Equals gals. per mo. .... 50 gals.  
Saving per month. .... 25 gals.  
Multiplied by cost per  
gal. .... 20c  
Equals monthly saving \$5.00  
Yearly saving. .... \$60.00

## The STRANSKY Vaporizer

J. A. STRANSKY MFG. CO.,

D-10 Stransky Block, Pukwana, So. Dakota

J. A. Stransky Mfg. Co.,  
D-10 Stransky Block, Pukwana, So. Dak.

Without obligation send me description and explanation of the Stransky Vaporizer and full details of your free trial offer.

Name.....

Address.....

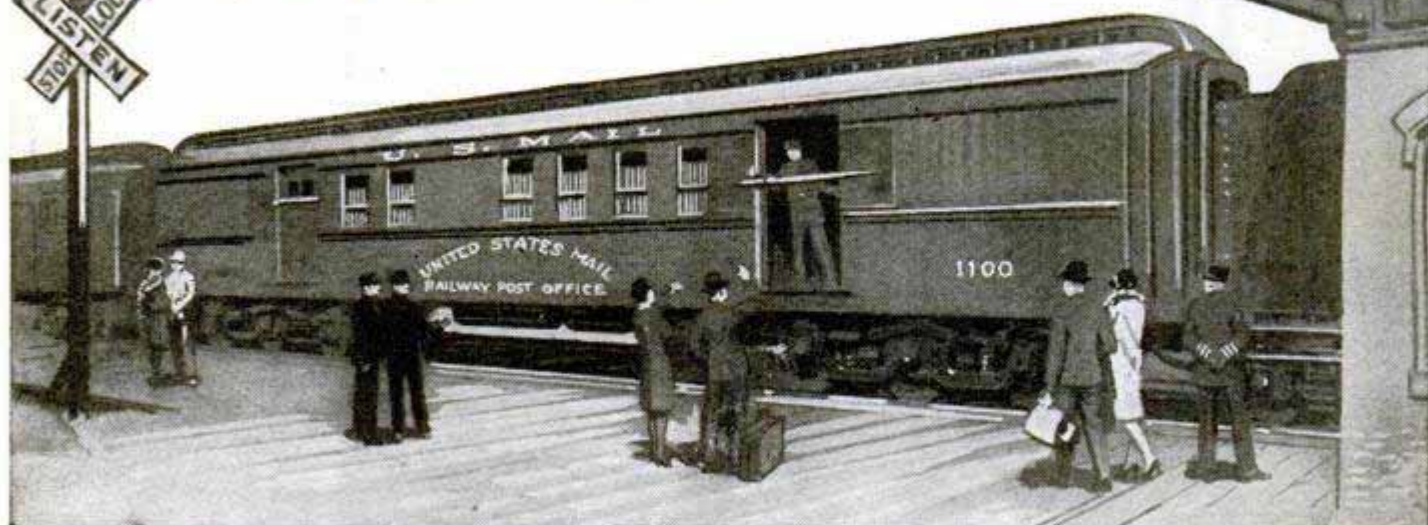
City..... State.....

( ) Check here for representative's full or spare time money-making plan.



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## \$1900.00 TO \$2700.00 YEAR



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Rush to me entirely free of charge: (1) A full description of the position checked below; (2) Free copy of 32-page illustrated book, "Government Positions"; (3) A list of U. S. Government Jobs obtainable; (4) Tell me how to get the job checked.

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 ... **Post Office Clerk** .....  
 ... **City Mail Carrier** .....  
 ... **Rural Mail Carrier** .....  
 ... **General Clerk** .....

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 (\$1900-\$3300)  
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 Use this Coupon before you mislay it. WRITE OR PRINT PLAINLY

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**MEN—WOMEN 18 OR OVER**

Short Hours  
 Rapid Advancement  
 Pleasant Work  
 Permanent Employment  
 Long Vacation with Pay

Mail Coupon Now. Act at Once.

**DO IT TODAY. TOMORROW  
 YOU MAY FORGET.**

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A command of effective English gives you added advantages and better opportunities. Poor English handicaps you more than you will ever realize. You can improve your English through Sherwin Cody's 100% self-correcting invention.

If you are ever embarrassed by mistakes in grammar, spelling, punctuation, or pronunciation, this new free book "How to Speak and Write Masterly English" will prove a revelation to you. Send for it now. It is free. Address  
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**Here's An Easy Way!**

—to bring you a fine cash income! Without taking any time away from your job. Pleasant easy work at home. Decorate beautiful giftwares the Fireside way. You can do it—in spare moments. No previous training required. No special ability needed. No tedious study. No memorizing. With the Three Simple Steps sent you by Monsieur Petit the great artist—Director of Fireside Industries, it is just fun! We want men in every community. Be the first! **Fireside Industries, Dept. 66-D, Adrian, Mich.**

**Begin Right Now!**

Thousands are making Fireside decorations—making from hundreds to thousands of dollars and doing their own work besides. We supply you with everything you need. Big Generous Complete Kit WITHOUT EXTRA COST. It's a cinch! We absolutely guarantee your success.

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Fill out and mail coupon at once. Without any obligation it brings you wonderful Fireside Book in colors. Explains everything. Act now!

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Name.....

Address.....





# Look! Bald Men

One Full Ampoule of my amazing hair fluid which I discovered myself and which grew hair on my head.



## FREE

This Ampoule is absolutely free. Don't send any money. There is no C.O.D. No charge whatsoever. All I want is an opportunity to show you how easily I grew hair on my own and hundreds of other men's heads. Merely mail the coupon below for free Ampoule.

### Here Is How I Used to Look

I was just as bald as this picture. It is a true photograph without any tampering or retouching. It is exactly as I used to look. Then look at the full head of hair I have in the picture on the left.

As I have stated so often, I don't know whether I am the first man who discovered this great secret, but I do know I have it, that I grew my own hair and that I am growing hair on the heads of other men all the time.



## Bald Men Grow Hair Quick!

What I accomplished on my own head and on other heads I can do for you, provided you are under 45 years of age and loss of hair was not caused by burns or scars. Anyhow, I must succeed or you pay nothing. No apparatus. My home treatment is simple, quick, inexpensive.

## Mail This Free Coupon!

Mail the coupon today—Right Now—I will send you, immediately, one full Ampoule of my marvelous fluid which I discovered, of which I hold the secret and which grew my own hair on my bald head. Besides the Free Ampoule of Fluid, I will send photographs, names and addresses of men and women who successfully used my Wonder Fluid for Dandruff, Falling Hair and Baldness.

### Vreeland

1354 Euclid-Windsor Bldg., Cleveland, O.



Here is  
← **Brennan**  
Brennan while he was bald.

And Brennan after Vreeland grew his hair. Write and I will tell you Brennan's story and give you his address.



Here is  
**Wiseman** →  
Wiseman was bald.

But Wiseman grew his head of hair with my wonderful hair growing fluid. All about Wiseman and how he did it, if you write. You will get his address, too.



## FREE COUPON

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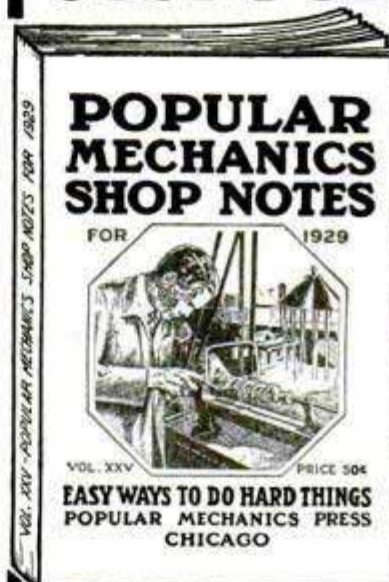
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I take pleasure in informing you through the use of the New Science System my rupture is entirely relieved. At the time I ordered your System I had been ruptured 20 years.  
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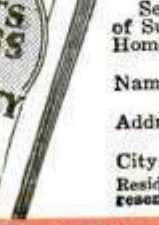
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**BEFORE** Advertising get our catalog. No charge. 25 years in business. The largest classified agency in the world. Ankrum Advertising Agency, 100 No. LaSalle St., Chicago, Ill.

**GET** into advertising. Learn quickly at home. Experience unnecessary. New easy plan. No text books used. Practical work. Old established school. Send name and address for interesting free booklet. Page-Davis School of Advertising, Dept. 3431, 3601 Michigan, Chicago.

**FREE**—New 1929 Advertisers Rate Guide. 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

**ADVERTISE** 50 Magazines 5c word; \$4.00 inch. 5,000 country weeklies 1c line, per paper; lists free. Evans King Co., 672P, Wilmington, Del.

**INCH** Display 50 Monthlies Thrice \$8.00. Meyer Agency, 4112M Hartford, St. Louis, Mo.

### FOR ADVERTISERS

**ADVERTISE**, 25 Words 50 monthlies 100 weeklies \$5.00. Lists free. Allen, 234 Bound Brook, N. J.

**ADVERTISE** 300 Country newspapers, 28 words, \$10. Business getter. Lists free. Keator, Hartford Bldg., Chicago.

**ORIGINAL** Late 1929 letters and names for sale. Price reasonable. Smith's Service, L-1194, Wenatchee, Wash.

**40 WORDS** Insert 50 magazines \$2.00. Empire Agency, Shawano, Wis.

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**\$50 TO \$50,000** Daily Sales Developed during 28 years for clients by our direct mail plans, copy, campaigns. One product, 1923, an idea; this year \$100,000 orders booked. Fifty year old concern desired 50 national representatives in 1925; we produced 40 in three months. 700 dealers in 10 months at \$3 each, for another. Ten years Sales Promotion Manager Larkin Co. Submit sales problems for free diagnosis. James C. Johnson, 118A Woodbridge Ave., Buffalo.

**DON'T** Experiment! Dollar-doubling letters, circulars, literature, campaigns. Long, successful experience. Moderate charges. Finkel-Advertising, 131-P, Glenwood, Jersey City, N. J.

**"THE Master Letter Writer,"** including 500 successful letters, by Ad-Man Davison, world-famous letter expert; 704 pages, \$3. Circular sent. Opportunity Press, Westport, Conn.

**MARKET** Analysis of your product; sales program. Banning, Times Bldg., Watertown, N. Y.

### BUSINESS ADDRESSES

**CHICAGO**—6 No. Michigan Ave. A real address. Write Russell Albin.

**HOLLYWOOD** Address and postmark, \$1. Hollywood Mailing Service, Box 944, North Hollywood, Calif.

### AGENCIES WANTED

**CHICAGO** Concern, central offices and sales force, desires to represent articles of merit for Chicago and vicinity. Sanders & Co., 105 N. Clark, Chicago.

### LETTER SPECIALISTS

**BUSINESS** Building letters, circulars, booklets, speeches, etc., prepared. Rates moderate. Suggestions submitted free. Maynard Clemens, 2044 Kennedy Ave., Baltimore, Md.

**AD-MAN** Davison writes letters, folders, booklets; success by mail; send your literature for Free Suggestions. Westport, Conn.

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**DON'T** Buy a new radiator—Use plumbers' secret. Also saves hot-water systems. Dime and your address brings everything. Mechanics' Service Bureau, Marina Station, Mayaguez, Porto Rico.

**TIME** Counts in applying for patents. See pages 140 and 141. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

### AUTOMOBILE SUPPLIES

**AUTOMOBILE** Formulas save you big money; easily compounded yourself, trifling cost. Reduce gas consumption, radiator leak stop, windshield anti-rain solution, body polish, metal polish, glass polish. Also valuable to start business for yourself. These six big money savers, only \$1.00, sealed. Order today. Dugdale Laboratories, Kearny, N. J.

**TARNISH** Proof keeps all metals from tarnishing. Used on nicked automobile radiators, silverware, brass, etc. 4 fluid oz. can. Price \$1.00 postpaid. Agents wanted. Blue "J" Co., 4941 Magnolia Ave., St. Louis, Mo.

**SAVE** Money on auto and truck repairs. Gears, axles, bearings, motor and transmission parts at 50 to 75% off factory list prices. Satisfactory parts guaranteed. Prompt service. Price lists free. Century Parts Co., 1712 Lafayette Ave., St. Louis, Mo.

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**RADIATORS** At wholesale prices. All standard makes. Satisfaction guaranteed. Send for prices, stating make and model. Independent Radiator Co., 1119 S. Wabash Ave., Chicago.

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**42 MILES** On 1 gallon. Wonderful moisture gas saver. All autos. 1 free. Critchlow, P2-805, Wheaton, Ill.

**BARKING** Dog horn. Newest horn for your car. Barks like real dog. \$2.50. John Samon, Yorkville, N. Y.

**FOR** Sale—Used auto parts for all makes and models. J. Trockman & Sons, Inc., Evansville, Ind.

**KOO KOO**, Newest sound device for all cars, independent, \$2.50. Koo Koo Mfg. Co., Box 323, Hollywood, Calif.

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**SAVE** Money—Garage equipment reconditioned and guaranteed like new. Unusual bargains in test stands, car washers, battery chargers, air compressors, etc. Shipped on trial, easy terms. What do you need to complete your equipment? E. C. Galbreath, Box M-494, Troy, Ohio.

**USED** Constant potential outfit—120 ampere fully equipped. Guaranteed like new, overhauled and repainted. A wonderful bargain. Will ship on trial and allow plenty of time. E. M. Connor, Box M-492, Troy, Ohio.

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**PRICES** Slashed! Send for catalog showing bargains in rebuilt genuine Harley-Davidson motorcycles. Some as low as \$50.00. Fully guaranteed to look, act and last like new. Special easy-payment plan. These bargains won't last long. Write today. Heinz Motor Company, 610 West North Ave., Baltimore, Md. (Authorized Harley-Davidson Distributors).

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**BARGAINS** in used motorcycle parts for all makes. No Catalogs. J. B. Dahl, 3661 Archer Ave., Chicago, Ill.

**NEW** And used motorcycle parts and accessories. Elmer Nelson, La Moille, Ill.

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**THE** American School of Aviation announces a new correspondence course in mechanics of aviation. A thorough training in practical aeronautics. American School of Aviation, Dept. 1872, 3601 Michigan Ave., Chicago, Ill.

**BUILD** Your own sport plane: We furnish free with the purchase of a wing mold, a set of blueprints and dopesheet. Any curve and cord \$8.00. Circular 10 cents. Airman Engineering Company, 552 Polk St., San Francisco, Calif.

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IT Is not difficult to learn to fly your own aeroplane under our method. No examinations, no red tape necessary. You pay according to your ability to learn. (If you learn rapidly you do not pay the price of a backward student.) Fly under the personal supervision of Lieut. Hart Smith, 12 years flying experience under all conditions, training hundreds of students and carrying over 50,000 passengers without injury to passenger, student or self. Erickson flies alone in our Waco plane in 6 1/4 hours. Ferguson soloed in one day elapsed time. Send us your name and we will send you free of charge our Private Aeroplane Owners Ground Course. Learn this ground course and you are ready to get into one of our planes with an instructor and fly as soon as you arrive at our school. 9 types of planes available. Two good fields. Wisconsin Air Lines, Inc., South Sheridan Road, Kenosha, Wis.

**PROPELLERS** For model aeroplanes. Semi-carved 6" 35c; 8" 40c; 10" 45c; 12" 50c. Postpaid. Aero Shop, 3050 Huribut Ave., Detroit, Mich.

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**PROPELLERS**, For snow and ice sleds. Small airplanes and boats. We specialize in propellers for Harley Davidson, Indian and Henderson motors. Blueprints for ice sleds, one dollar. Crawford Airport, Seal Beach, Calif.

**MOTORCYCLE Engines** for airplanes, motor boats, ice sleds, wheels, tires, chains, gasoline tanks. Send 50c for catalogs. Price Cutter Deninger, Rochester, N. Y.

**BUILD Model airplanes** that fly. Our 52 page catalog illustrates 26 flying and exhibition models. Most complete line of accessories and supplies. Send 10 cents for our big catalog. U. S. Model Aircraft Corporation, 341 Monroe St., Brooklyn, N. Y.

**LUCKY'S Model airplanes** fly fast and far. Bargains in supplies. Send five cents for catalog. Lucky's Model Shop, 552 Polk, San Francisco, Calif.

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**BUILD And fly your own monoplane**. 20 foot wing spread, 72 mph with 12 hp. motor. Plans and working drawings complete, \$10 folder ten cents. Warner Co., 311 Edwards Bldg., Cincinnati, Ohio.

**FOSTER'S Model Aeroplane & Supply Co.** Send five cents for manual. Teaches building and flying. Full stock parts and plans. Ideal construction sets. 5503 Hudson Boul., North Bergen, N. J.

**TIME Counts** in applying for patents. See pages 140 and 141. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**HOME Study aviation course** by pioneer school at new low price. Covers motors, meteorology, nomenclature, aviation, design, flying and 100 other fascinating subjects. Endorsed by experts. Diploma given. Free employment service. Complete details sent free. National Aviation Training, Dept. 115, 1031 So. Broadway, Los Angeles, Calif.

**WRIGHT Airplane engines**, 8-cylinder, water cooled, 300 horsepower, \$300.00. Karl Ort, York, Pa.

**AIRPLANE Motors**, 80 horsepower, air-cooled, \$100.00. Karl Ort, York, Pa.

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**NEW Engines and parts** all airplane motors. Hall Scott \$175.00 round metal mooring buoys; spark plugs 25c, magnetos, instruments. Crawford Airplane Supply Co., 345 Washington Blvd., Venice, Calif.

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**SEND One dollar** for our wonderful book, Simple Aerodynamics and the Practical Airplane. For the amateur designer and builder. The Crawford Motor and Airplane Manufactory, Seal Beach, Calif.

**BE An aviator!** Design and build your own baby airplane to fly with motorcycle engine. Booklet illustrated with fine drawings one dollar. Hodgdon, 324 Bay, Springfield, Mass.

**THE Plane with the \$10,000 performance**. Heath super parasol, America's most popular sport plane. Build it for \$199. Send 10c for large 1929 booklet just off the press. Heath Airplane Co., 1727 Sedgwick St., Chicago, Ill.

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**JUST Out**—Booklet and blue prints on construction of sportplane. Contains also flight instruction, motors to use, etc. All for one dollar. Russell Aero Company, Box 455, Toledo, Ohio.

**EAGLE Model airplanes**. Ready-to-fly. Knocked down. Best models obtainable. Real low prices. Catalogs 5c coin. Eagle Model Airplane Co., Box 152, North Haven, Conn.

**CLINTON Airplanes**—The best performing and most true to life models obtainable. All types; send dime for catalog of ready-to-fly models and construction outfits. The Clinton Toy Corp., North Haven, Conn.

**VARIOUS Sizes** wood, reeds, bamboo, rubber band, wheels, propeller, onion skin covering and other supplies. Big bundle for 25c, five for \$1.00. No stamps. Will also send circular on free three foot model. Aero Shop, 3050 Huribut Ave., Detroit, Mich.

**"SKYWARD Ho!"** Wonder book on aviation—32 pages, 150 illustrations. Shows you complete training for flying career, fame, fortune! Sent free. Write today! Parks Air College, 213 Mo. Theatre Bldg., St. Louis, Mo.

**MODEL Airplane supply**. August Schaefer, 29 North Ave., New Rochelle, N. Y. Send for free catalog.

**BUILD Our wonderful one-place monoplane** adapted to motorcycle or other small aircooled motors. Detailed blueprints \$2.00. Literature dime. Hawley Aircraft, Box 121, Sta. C., San Diego, Calif.

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**NEW**—Sept. combination movie and still camera with f:3.5 Anastigmat lens, six magazines, also carrying case, \$29.50. Practically new. Barker motion picture camera, 200 foot capacity, with f:3.5 Tessar lens, \$47.50. Send for our free bargain book listing hundreds of other still and motion picture cameras. Central Camera Co., P.M.-4c, 112 So. Wabash Ave., Chicago, Ill.

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**EXCELLENT** Westerns, features. \$2.50 per reel. Stewart Marshall, Rome, Ga.

**BE A movie exhibitor**—Big opportunity—Only moderate capital required—Complete equipment at remarkably low prices. Write. Atlas Moving Picture Co., 624 South Michigan Ave., Chicago, Ill.

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**WANTED** To buy—Second-hand Powers, Simplex and Motograph machines. Also extra mechanisms and stands. Must be bargains. P. O. Box 202, Birmingham, Ala.

**TIME** Counts in applying for patents. See pages 140 and 141. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

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**THOUSANDS** Joining American Radio club. Keep up-to-date on radio. Large benefits, small dues. Particulars free. Asst. Secy., 1 Box 83, Pitman, N. J.

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**DEALERS** And set builder bargains: Transformers, 75c. Condensers, 50c. Rheostats, 25c. Vogue Loop Antennas, without base, 95c. Tubes, 201A, 60c. UX226 AC, \$1.00. UX280, \$1.75. UX227, \$1.75. Send money order with order. Complete list on request. Chas. Hoodwin Co., 4240 Lincoln Ave., Dept. 11, Chicago. Dealers in Bankrupt Radio Stocks.

**DISCOUNT** All standard makes. Mention kind wanted. Write Radioman, Lake, N. Y.

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**TIME** Counts in applying for patents. See pages 140 and 141. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

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**BEST'S** Wonder cloths sell fast. 100% profit. Box 237, Wooster, Ohio.

**AGENTS**—Magic hot pads, fairy damask table covers, sponge rubber mats and 50 other fast sellers. Write B & G Rubber Company, Dept. 401, Pittsburgh, Pa.

**EARN** Big money introducing "Namo" snap-on coat marks. Send 35 cents for sample and particulars. Jed Company, 1200 Broadway, New York.

**ADDING** Pencil. Adds mechanically, almost human. Opportunity to make big money daily. Get sample and territory immediately. Add-O-Graph Co., Dept. 25, Saltillo, Miss.

**AGENTS** Wanted: We manufacture sanitary brushes. Commission 50%. For further details write Handy Brush Co., 15458 Livernois, Detroit, Mich.

**AGENTS \$90 Week.** Write orders for finest line guaranteed hosiery ever shown. 126 styles, colors. Finest silks. 35% commission paid daily. Producers earn new Ford car. We give you fine silk hosiery for your own use. Write quick for samples. Wilknt Hosiery Co., Dept. 6831 Greenfield, Ohio.

**AGENTS:** Make big money! New invention sells on sight to mechanics, motorists, surgeons, plumbers, railroad employees, and scores of other trades and professions. Write today for complete information and our proposition. Address: Sales Manager, 409 Z Amarilla Bldg., Amarilla, Tex.

**\$75-\$125 WEEKLY.** Glo-Bac amazing new necessity for every car owner, garage. Easy sales. \$2.00 saves \$75.00. Big profit. Marvel-Glo Company, Dept. B-1, Columbus, Ohio.

**MAKE \$15.00 Daily!** Simply show rhinestone initial buckles, fountain pens, etc. We deliver. No competition. No investment. Write quick for special free sample outfit. Chaton Novelty Co., Dept. C. 606 Blue Island Ave., Chicago.

**SELLING** Like blazes! Beautiful toilet goods assortment at \$1.50 with 24 inch pearl necklace free to your customers. 100% profit. E. M. Davis, 234 W. North Ave., Dept. 530, Chicago.

**\$10-\$25 DAILY** Simply showing new Polly wrench. 10 wrenches in one. Guaranteed seller. Sample free. Gellman Mfg. Co., Dept. 6-D, Rock Island, Ill.

**NEW!** \$10-\$15 Daily showing patented article of unusual merit. \$1.50 up. Real comfort. Endorsed by leaders in business and sports. Free sample! Flexible Buckle Belt, F20 E. Jackson, Chicago.

**AGENTS**—Fastest selling household necessities for men and women. Big profit. Ideal Utensil Company, Otis Bldg., Chicago.

**\$15 DAILY**—Genuine DuPont hemstitched tablecloths, luncheon sets, table runners. Wash like oilcloth—look like linen. Six colors. Sample free. Doll-ette, 1018 Wabash, Chicago.

**MARVELOUS** Auto safety signal. Life saver, almost human. Ornamental, compact, cheap, sells on sight. Illuminated hands tell right and left turns, works almost automatically. City and state officials buy it and endorse it. No auto owner can resist. Write for free trial offer and literature; act quickly; agents can readily make \$5,000 and more per year. Room 1104, Popular Mechanics Magazine, Chicago, Ill.

**MAKE \$50 A week** selling gold bond guaranteed hosiery. Build a permanent business. Full or spare time. Sample outfit free. Write at once. Gold Bond Hosiery Company, Dept. 194, Philadelphia.

**MAKE \$20 To \$35 a day** selling Imprint Book Matches, spare or full time. Big repeat business—no investment—every merchant a prospect. Write Imprint Book Match, Dept. 114, 877 Meigs St., Rochester, N. Y.

**MAKE \$500.** Show tablecloths. Save laundry bills. Women scramble for them. Free sample. Mohler, Box 453-AG, Chicago.

**\$75 WEEKLY.** Man or woman wanted with ambition and industry, to distribute Rawleigh's Household Products to steady users. Fine openings near you. We train and help you so you can make up to \$100 a week or more. No experience necessary. Pleasant, profitable, dignified work. Write today. W. T. Rawleigh Co., Dept. D-53 PFM, Freeport, Ill.

**SAMPLE** Free. Big Chief hand soap (Powdered-Medicated). Has no superior. 200% profit. Austin Accessories Mfg. Co., 2638 Shields Ave., Chicago.

**AGENTS.** A real gold mine! See Dome Specialties display ad page 161.

**100% PROFIT**—Wonder hotpad discovery. Banishes hot water bottle and electric pad. Tablespoonful water heats 12 hours. Sample offer. Applicator Corporation, MA 3361 Cottage Grove, Chicago.

**FREE**—Complete selling outfit free. We furnish honest and industrious men and women complete selling outfits free. Start a toilet and household specialty business of your own. Exclusive territory. Write today. W. C. Johnson Co., Dept. 22, Atlantic Highlands, N. J.

**CHICAGO** Expert valued \$3 stone at \$900. The diamond's only guaranteed rival! Greatest spare time, side-line article ever known! Amazing profits. \$5 pocket sample case free. Write quick! Mexican Gem Company, Dept. PM, Monterey, Calif.

**MAKE \$10 To \$50 daily** placing advertising, selling Penny Day Accident Policy; \$7,500 maximum benefit; \$100 monthly indemnities; guaranteed income from renewals. American Benefit Corp., Mgrs., Myers Bldg., Springfield, Ill.

**REMNANT** Store, Bethel, Ohio. Greatest Dry Goods Bargains on Earth. Agents and Dealers.

**AGENTS:** Stamping names on pocket-key protectors. Sample check with your name and address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., Desk 2, 303 Degraw St., Brooklyn, N. Y.

**AGENTS**—\$50 Weekly selling shirts. No capital or experience needed. Commissions in advance. Samples free. Madison Company, 566 Broadway, New York.

**\$3.99 PER HOUR** selling a service to keep stairways clean. Every housewife interested. Write today. Ideal Stairway Equipment Co., Dept. PM, Canton, Ohio.

**WANT** Distributing agent for Handslick, powdered hand soap; removes anything from hands; everybody a customer; sample free. Solar Products Co., J-2142 S. Troy, Chicago.

**START** The new year right! Manufacturing these popular specialties yourself. Have salesmen everywhere. Investment small. Profits great! Get my eye-opening literature explaining all. Mystery Polishing Floss, Loidiac, guaranteed automobile refinishing; Thermaxx Eveready Anti-Freeze; twenty-six new unusual carded specialties, many other wonderful necessities. Here's an exceptional opportunity. Miller, Chemist, 706-B Chemical Building, Tampa, Fla.

**BIG** Money and Fast Sales. Every owner buys Gold Initials for his auto. You charge \$1.50; make \$1.35. Ten orders a day easy. Write for particulars and free samples. American Monogram Co., Dept. 40, East Orange, N. J.

**GOLD** Leaf Window Letters and script signs; no experience; 500% profit. Sample free. Dearman made \$19.20 first 2 hours. Consolidated, 69T West VanBuren, Chicago.



**PHOTO Medallion Men and Women**, the largest line of Photo Novelties in the world. Lowest prices, quickest service. Send for catalogue showing over 200 money makers. Photo medallions, photo medallion clocks, photo mirrors, photo fountain pens, photo powder compacts, photo jewelry and photo buttons. Gibson Photo Jewelry Co., 608-614 Gravesend Ave., Brooklyn, N. Y.

**AUTO Owner tire agent** wanted each locality to use free demonstrating tires and take orders for new heavy duty Mellinger tires, guaranteed 15 months against all road trouble. Shipped on free trial. Get your own tires and earn \$300 monthly—no capital or experience needed. Write Mellinger Tire Co., Dept. 282, Kansas City, Mo., Warren, Ohio, Oakland, Calif.

**DON'T Sell for others.** Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**WANT** Something different—something sells easily? Then sell razor blades, all makes, under your own name, retail, wholesale, through agents and by mail. 40 page booklet 10c. The Ann Arbor Blade Co., Ann Arbor, Mich.

**SELL "Prevents Runs."** Guaranteed to prevent runs in silk hosiery. Large profits. Particulars, Specialty Mfg., 307 West First, Los Angeles, Calif.

**\$90.00 WEEKLY** Wearing and showing my beautiful new free raincoat and giving away free hats. Write today for yours. Robert King, 230 S. Wells, Dept. AB-4, Chicago.

**MARVELOUS** Product and selling plan will bring you over \$100 weekly. 500% profit! Big repeat business. Samples free. Write now. Ever-Ready, 52 East 9th St., Dept. D-8, New York.

**AGENTS:** \$16 Day and earn new Buick auto. Sell groceries. Over 400 items used daily every home. Steady all year job. Your own groceries about half price. Send for samples. Harley Company, Dept. D-2015, Dayton, Ohio.

**IT'S New—It's great.** Sells everywhere. Metal polish in tubes. A real money maker. Trial tube free. P. M. Reid Manufacturing Co., 1619 Clark, St. Louis, Mo.

**EARN \$48.00** Each week, earn auto and expenses to introduce our soap and washing powder. Buss-Beach Company, Dept. A42, Chippewa Falls, Wis.

**"MAGNAKLOTH"** Taking people by storm, one rub, absorbs dust from car or furniture, quick sales, big profits. National Service Co., P. Pierre, S. Dak.

**WONDERLITE** Sales company wants men to sell new magnetic trouble light. Most useful automobile accessory; sells at sight. Commission, special bonuses. Big money getter. Demonstrator and particulars on request. Industrial Trust Bldg., Providence, R. I. Dept. P.

**100% PROFIT.** Amazing paste quickly removes rain spots, polishes nickel on automobiles, etc. Complete line home necessities. Williams Corp., 305 Williams Bldg., Montclair, N. J.

**WE Will** manufacture your own formula into a finished product, in small quantities. Either as completed packages or in bulk; at reasonable prices. Correspondence invited. Barth, Box 68, Alton, Ill.

**GARAGE** Door holders. Large profits. Specialty Manufacturers, 524 Hall Bldg., Kansas City, Mo.

**HERE'S A** better proposition! \$7.50-\$22.50 daily, selling imitation maple sugar candy. Wholesale or retail. Experience unnecessary. Easy sales. Sure profits. Exclusive territory. Write! True-Taste, Union Springs, N. Y.

**SPONGE** Nozzle auto washer. Agents making big money. Retail \$2.00. Liberal discounts. Write the company. 3780 Clairmont Ave., Detroit, Mich.

**ALL Year** round profitable business. Earn extra money spare time selling wonderful new water softener and cleanser. Cleans like magic, grease, ink and dirt from everything. Every home and business place a live prospect. 100% profit. Big repeat orders. Agents protected. Trial case \$4.00 delivered U. S. A. Seacoast Laboratories, Inc., Sea Bright, N. J.

**AGENTS** Wanted to advertise our goods and distribute free samples to consumers; 90c an hour; write for full particulars. American Products Co., 2515 Monmouth, Cincinnati, Ohio.

**DISTRICT Managers!** Crew managers! General agents! Wanted: Men and women to appoint saleswomen to sell "New Idea" imported sanitary necessity. New feature never before used. Sells on sight. Every woman buys and repeats. Without capital new sales-plan nets you big commission on subagents' sales. Exclusive territory to producers. Write Box J-708 Meriden, Conn.

**AMERICA'S** Greatest tailoring line, free. 175 large samples all wool tailored to order, union made, sensational low price. Big commissions paid daily. Cash bonus besides. Exclusive territory to producers. Hustlers making \$100 a week and up. Get outfit at once. Address Dept. 78, Goodwear, 844 Adams, Chicago.

**20 MINUTE** Drying touch up enamel for auto bodies, fenders, chassis. Formula used by specialty manufacturer for years; sell to all auto trade. Formula and source of supply for \$2.00. E. F. Callan, 14807 Mettetal Ave., Detroit.

**AGENTS:** Men and women, sell Marvel, wonder-working \$1 office necessity. Universal demand, amazing profits. Sample furnished. Start own permanent, pleasant business. Address Marvel, Easton, Pa., for full particulars.

**"WHERE** To buy 500,000 articles at lowest wholesale prices." 1929 directory. Distributors wanted. Pruitt System, Brookfield, Ill.

**NEW!** Sell every home, office, garage, hotel and farmer our patented name plates for only 40c each, making 380% profit. No experience required. Send \$1 for stock to fill first orders; or, write for free particulars. Consolidated, 69-HR West Van Buren, Chicago.

**\$5.00 HOURLY.** Mercerized damask scalloped table cloths 75c. Tremendous demand. Other bargains. Experience unnecessary. Big sample line free. American Braiding, AP-329 W. Monroe, Chicago.

**AGENTS** Wanted on a fast selling 25c item for the kitchen; costs you 8 1/2c. Sample free. Send 2c stamp to cover postage. P. Seed Filter Mfg. Co., Ind., 353 Broadway, New York.

**THE Christensen** Mop Wringer. It rubs the mop and scrubs it clean. H. K. Christensen, Fort Atkinson, Wis.

**SELL** Handy tool to garages, large and small shops of every kind. Sell several each day with profit to you of \$2.50 each sale. Well advertised article. St. Paul Welding & Mfg. Co., 177 W. 3rd St., St. Paul, Minn.

**\$48 WEEKLY** Selling automobile trouble lights. No capital or expense required. Commissions in advance. Sticks anywhere on car—electro magnetic. It's also an everlasting flashlight. Sell itself on sight. Write for demonstrator and particulars. National Electric Corporation, 223 High St., Newark, N. J.

**AGENTS—New** hot bag. Patented. Nothing else like it. Requires 2 spoonfuls cold water. Keeps hot 10 hours. Use over and over again. For the home, outdoors, auto, anywhere. No competition. 100% commission paid daily. Make \$300 month. Write quick. Free sample for your own use. American Accessories Co., Room 831, Cincinnati, Ohio.

**SELLING** Like blazes! Eleven piece toilet goods assortment at \$2.25 with two piece carving set free to your customers. 100% profit. E. M. Davis, 234 W. North Ave., Dept. 511, Chicago.

**BE Independent.** Make, sell your own goods. Immense profits. Catalog dependable formulas, special selected agents' best sellers free. R. Lusto, 626 Reaper Block, Chicago.

**\$2.95 AUTOSEAT** Covers—Cash daily. Amazing all America. Postcard brings leatherette sales outfit. "Quality," JJ513 So. Dearborn, Chicago.

**STRANGE** Invention! Pays \$25 daily. Keeps telephone and iron cords from tangling and kinking. Prevents iron scorching. Saves electricity. Samples free. Never-knot, Dept. 4A, 4503 Ravenswood, Chicago.

**AGENTS—Mosco** Corn and Callous Remover will build you a steady repeat business. Send today for pocket-size trial outfit. The Moss Company, 429 Searle Bldg., Rochester, N. Y.

**\$50.00 WEEKLY.** Men wanted to demonstrate and take ten orders daily direct from motorists. Amazing magnetic trouble light. Sticks anywhere! More orders, bigger pay. Write for demonstrator and particulars. Magno Co., 6 Beacon St., Dept. 164, Boston, Mass.

**MONEY** In your pocket every day, selling our metal collapsible garment hanger or the folding hat and coat hanger. House to house selling. Retail \$1.00 each. Costs 50c. All unsold goods returnable and money refunded. Sample 50 cents. Bd. Gause Mfg. Co., Elkhart, Ind.

**\$100 WEEKLY** Appointing agents Mother Hubbard Foods. No canvassing, delivering or investment. Mother Hubbard Products, 554U Congress, Chicago.

**AGENTS:** Get vanilla extract at one cent a bottle. Also new black walnut flavor. Welcome Foods, Harvey, Ill.

**SELL** Ties—Make big profits. Get big sample selling outfit absolutely free. Wonderful patterns; splendid values; liberal commissions. Write today to Public Mills, 4929CF Hudson Boulevard, North Bergen, N. J.

**\$\$ MONEY!** Big money! \$\$ Carter Window Washer. Exclusive territory. Cleans, dries and polishes—one operation. Sells for \$1.95. Big profits. Sample \$1.00. If dissatisfied, money refunded. Carter Products, 978 Front, Cleveland, Ohio.

**AGENTS—Clean-Rite** window cloths, washes windows without soap, water or powders, enormous demand, tremendous profits. Write quick. Gordon Dustin, 73 Bridge St., Watertown, Mass.

**WONDERFUL** New sideline—Astonishes everyone; honest and repeats. I can prove it. Write Allneeds Mfg. Co., Box B-826, Chicago, Ill.

**SOMETHING** New. Agents and dealers. \$15.00 to \$45.00 every day. American novelties, also from Japan and Europe. License and experience unnecessary. Send 25c for samples and full particulars. None free. Northwestern Novelty & Supply Co., 543 North Ashland Ave., Chicago.

**AGENTS** Become a regular established McConnon dealer! Buy on credit; sell for cash or credit. 228 absolute household necessities; all repeaters. Enjoy a sure income 52 weeks per year, year after year. City or country trade. Capital, experience unnecessary. McConnon & Co., Dept. M904, Winona, Minn.

**SELL** Wool chenille rugs. Latest sensation. We deliver. Pay daily. Free particulars. Southern Rug Works, 1206 Ninth, Washington, D. C.

**WORLD'S** Two greatest sellers—Lice Rid-dance Nest Eggs and Ha-Pe-Da (No-Rub) washing tablets. Both samples (with particulars) 10c. Carl-Abbott Company, Oswego, Kans.

**FROM** The Argentine. Imported from Buenos Aires, latest novelty, never before on American market, tremendous possibilities. Write: don Francis X. Cassera, Dept. PM, 23 Washington St., New York.

**AGENTS** Free sample fast selling mail-order and agency specialty. Repeater. Big profits. Going strong. Flinger, 5003 X, Gateway, Kansas City, Mo.

**\$15 DAILY** Selling guaranteed dresses, shirts, lingerie. Largest cash commissions, extra bonuses. Outfits free. District managers wanted. Parmode, 21 Lesser Bldg., St. Louis.

**FREE** Booklet describes 67 plans for making \$20-\$100 weekly; home, office. Your own business. Elite Co., 84 Elizabeth St., New York.

**\$85 WEEKLY** Selling nationally advertised dresses, lingerie, hosiery, amazing value. Complete equipment and your own clothing free. Sure profit plans furnished. Shaughnessy Knitting Co., 343-C Shaughnessy St., Watertown, N. Y.

**FREE** Booklet describes 67 plans for making \$20-\$100 weekly; home, office. Your own business. Elite Co., 84 Elizabeth St., New York.

**SELL** Stores carded 5c Breathlets. Cost you 1c per package, 150% profit. S. H. Carroll Co., Albany, N. Y.

**BRAND** New auto accessory. Can't run out of gas. Dozen in coat pocket to wholesale or retail. Big profits. Fine side line. Sample 25c. Lupton, Hill & Lupton, Dayton, Ohio.

**HANDYMAN** Shop: painting, fixing; start yours on nearly nothing. Braceland, 1457 So. Ninth, Philadelphia, Pa.

**NEW** Patented necessity; pocket carries dozens; \$7.20 dozen; sells \$1.00 Sample 65c. Write Rex Sales, 1235 Lexington Ave., New York City.

**OH Hello** Why didn't I see this before? Christy's iron rust and stain remover sells like blazes. Write for free sample. Christy, Inc., 5067 Canal, Newark, New York.



**\$40 TO \$100 Weekly, easily.** New 25¢ specialty, 150% profit. Quick demonstration sells every housewife. Pocket sample. Deliver on spot. Fine side line. Agents, distributors cleaning up. Territory going fast. Write today sure. Harker Specialties, Battle Creek, Mich.

**A GOLD mine—New liquid discovery** mends fabrics-hosiery. Stops runs. 400% profit! Every woman buys. 100 other fast sellers. Johnson Co., Dept. 476, 6129 Wentworth, Chicago.

**\$50,000 PICTURE** Man Friedman made canvassing. Beginners can make \$100.00 weekly with my sales talk. Experienced men make more. Free book "Profits in Portraits" explains. Sample free. Picture Man Friedman, Dept. 8, 109 West Austin, Chicago.

**SALESMAN** Wanted to represent half million dollar manufacturer. No cash required. Big sample outfit free. Sell paints, varnishes and roofing with money-back guarantee, direct from factory to user. We give exclusive territories in which our men can earn \$4,000 to \$10,000 a year. Permanent position. Manufacturer, Box 797, Dept. 32, Kansas City, Mo.

**\$25 DAILY** Selling newest Damask tablecloths; no laundering, ironing; complete line raincoats, trenchcoats, umbrellas and rubber specialties. Free outfit. American, B724 Roosevelt, Chicago.

**MAKE \$50-\$75 A week.** Everyone needs shoes. Sell Mason's all-leather shoes, amazingly low prices. 85 styles—men's, women's, children's. No experience needed. Big outfit free. Mason Shoe Mfg. Co., Dept. 224, Chippewa Falls, Wis.

**MAKE Money** in your spare time by selling folding chairs and novelty furniture to your friends and neighbors. Lafayette Chair Corp., North White Plains, N. Y.

**AGENTS—Make \$10 daily.** Latest Ford sedan given. Finest line 200 guaranteed extracts, pure foods, toiletries, remedies. Agents and district manager wanted. Write today. Perkins Products, M-12, Hastings, Nebr.

**\$60-\$200 A WEEK.** Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark Chicago.

**AGENTS—\$240 Month.** Sell silk hosiery guaranteed 7 months. Producers earn auto. Samples furnished. Free silk hosiery for your own use. Write today, state size of hose worn. Betterknit Hosiery Co., Silk 4031, Greenfield, Ohio.

**42 MILES** On 1 gallon. Wonderful moisture gas saver. All autos. 1 free. Critchlow, P4-805, Wheaton, Ill.

**DON'T Sell** for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**\$13.00 DAILY** Installing stair corners. Amazing new money-making opportunity. Sample and particulars free. M. Ruth Co., Wheelersburg Ohio.

**AGENTS, \$300 Month.** Bonus besides. Dri-Kleanit makes any car look like new. Slickest thing you ever saw. Removes dirt, grease, tar, all one operation. No soap or water used. Cleans any car for 10¢. Wonderful seller. Write for sample. American Accessories Co., Desk 4631, Cincinnati, Ohio.

**SELL Famous fashions** from Fifth Avenue. \$95 weekly. 100% virgin wool suits, ramshorn wool, camel's hair topcoats, \$19.75, \$4 commission; special numbers \$13.75; commission \$3.50. Free outfit. Dept. PM-4.

**CASH Paid** for Butterflies, Insects. See Sinclair Display Advertisement on page 24.

**TIME Counts** in applying for patents. See pages 140 and 141. Clarence A. O'Brien, Registered Patent Attorney, Washington, D. C.

**INSTANT** Weld welds rubber instantly. Steck's profit one day \$72.25. Enormous demand. Exclusive territory. Free sample. Tourists Pride Mfg. Co., Desk E, Minneapolis, Minn.

**AGENTS—New window seat** sells on sight to every housewife. Permits washing windows safely, comfortably. Exclusive territory. Banker Co., 503 Fifth Ave., New York.

**MAKE \$10.00** Every day introducing new automatic window washer. Amazing invention. Send for free sample offer. National Industries, 67 E. Lake St., Dept. 154-C, Chicago.

**EARN \$15.00 A day extra—Every man** needs shirts: Sell Digbie nonshrinkable broadcloth shirts in assorted patterns; handsome free outfit containing actual shirting samples and photographs; commission paid daily puts you in shirt business without investment. Send name and address, receive sample outfit without obligation by return mail. Digbie, Inc., Dept. C-14, 258 Fifth Ave., New York.

**MAGIC Polishing cloth.** Great seller. Big profit. Try this cloth. It's a money maker. Samples free. Get this proposition. Newton Co., 25 Main St., Newark, N. Y.

**START A business** of your own selling fifty different kinds of household brushes. Send for catalog and free sample case offer. National Brushes, St. Louis, Mo.

**AGENTS** Cleaning up with Lanowa combination. 65¢ clear profit every dollar sale. Write for free sample. Great Western Industries, 4125D Penn., Kansas City, Mo.

**WANT A bigger income?** Write now for the fastest-selling line in America. Get my free outfit, latest shirt fabrics. Full year guarantee with every shirt. Free initials 48-hour delivery. Biggest commissions in advance. Leonard Gould, Dept. PM4, 1237 Broadway, New York.

**AGENTS—Salesmen, \$75 weekly** up placing popular-priced Aspirin. Silk-Life and other self-selling display cards with merchants, soda fountains, cigar stores, etc. Steady income. Sideline or full time. New plan. Sterling Company, Dept. F, Baltimore, Md.

**AGENTS—You can make \$75 clear every week—earn big cash bonuses** and earn new automobile by becoming my exclusive agent. No capital or experience needed. Ask for free sample case. No deposit required. Hoyt Bros., Inc., W94 Shipman, Newark, N. J.

**CASH In \$20 a day** with new automatic gas lighter. Free sample starts you. Rush name and address. Masterlite, 110 East 23d, New York.

**AGENTS** Buy direct hosiery, lingerie at lowest mill prices. Unusual opportunity. Act quick. Superior Knitting Co., Dept. 17, New Haven, Conn.

**WRITE Atlas Sign Works** for free working equipment. Beautiful gold window sign letters. Penny each! Any size. Wonderful offer to general agents. K1032 E. 55th St., Chicago, Ill.

**AGENTS—Our 1929 sales plan** is a sure winner. Details free. McKee Specialty Co., Minneapolis, Minn.

**SELL "Scalesavers."** 200% profit. Roman Arndt, Box 1401, Detroit, Mich.

**DISTRIBUTORS** And agents: For tire changer for new Ford. New invention. A wonderful proposition. Lawrence P. Raleigh, 3216 N. Francisco Ave., Chicago.

**WE Want men** who want money. Send 10¢ for 40 page booklet. O. K. Sales Co., Box 144, Overlea, Md.

**BIG Pay every day** taking orders for dress and work shirts, pants, overalls, underwear, sweaters, hosiery, pajamas, play-suits! Experience unnecessary. Outfit free! Nimrod Co., Dept. 8, 4922-28 Lincoln Ave., Chicago.

**AGENTS.** Send for free sample. "Fretnot" washes clothes snow white without rubbing. \$5.00 daily and more easily made. Credit given. Empire, 1549 N. Wells, Dept. 201, Chicago.

**3,000 VALUABLE Formulas** prepaid \$1.00. National Sales Service, 3937 Marburg, Cincinnati, Ohio.

**GENERAL Agents—Something new.** Whirlwind seller. "Repeat" washing powder. Washes clothes without rubbing. Women throw away washboards. Big profits. Exclusive territory. Write today free package. Kittredge Co., 82 Putnam St., Tunkhannock, Pa.

**MAN In each town** to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

**BROUGHT** From Holy Land. Fascinating, inspiring religious novelty. Christians buy on sight. Big commissions. Write Jadet, 1472 Broadway, New York.

**FLAVORING** Extracts—Bottle yourself! Concentrated, add water. Free labels. 600% profit! Whirlwind money-making opportunity! Hurry! Thomas Manufacturing Company, Indianapolis, Ind.

**EARN \$10 To \$15 daily, \$5 evenings,** showing startling new trouble light. Sticks anywhere on car by electro-magnetism. Just demonstrate, motorists grab it. Big cash commission and extra bonus. Best season just starting. Write quick. Lea Sales Co., 426 Shell Bldg., St. Louis, Mo.

**IT Rings the bell** for salesmen who must have big money. Krystal Kleen actually sells 100% on calls. Its demonstration is irresistible, its field is three-fold. Fifty-fifty deal. Write today. Fenton Chemical Company, Jackson Heights, New York.

**WE Have the finest needle case,** self threading needles, needle threaders. \$50.00 to \$200.00 weekly. Samples 25¢; particulars free. Empire, 1549 N. Wells, Dept. 201, Chicago.

**40 CENTS Profit** on every \$1.00 sale. Our article is a repeater. Excello Sales Co., Shreveport, La.

**SHARPENER** For scissors and knives. Has flat, movable, re-versible, and re-newable sharpening surface. Live seller at 300% profit. Sample 25¢. Lake Mfg. Co., Clarendon, Va.

**MAKE Big money.** Be the sign man in your town. New process. Beats them all. Particulars free. Swanson's, Inc., Mankato, Minn.

**DON'T Sell** for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984W Broad, Richmond, Va.

**AGENTS: Gold-eyed needle cases.** Beautiful cases at factory prices. Wonderful sellers, immense profits, \$50 to \$100 weekly. Proof free. Sample 10¢. Patsy Needle Co., College Ave., Somerville, Mass.

**BIG Profits.** No splash 4 strainer water filter; brass or nickel; ship quick; pay postage; free plugs when ordered; 6 doz., \$2.40, with bumpers \$4.50. Jones Mfg. Co., 243B2 Franklin St., Boston, Mass.

**FIBRE Brooms—detachable handles,** fine finish. Good profits, repeat sales. The Fibre Broom People, 147-C New Jersey Ave., Brooklyn, N. Y.

**AGENTS** Make \$3.00 an hour taking orders for our 40 fascinating kitchen specialties. No competition. Write quick. General Products Co., Dept. 207, Newark, N. J.

**WE Start you** without a dollar. Soaps, extracts, perfumes, toilet goods. Experience unnecessary. Carnation Co., 641, St. Louis, Mo.

**BIG Profits! Fast sales! \$9.75 automatic washing machine.** Guaranteed. Write Storm Royalty Co., 3601 Enright, St. Louis, Mo.

**ELECTRIC Cigar lighters.** Make \$100 week. Brilliant flashing advertisements. Three beautiful models. Used by dealers everywhere. Write Drake Mfg. Company, Dept. M, Milwaukee, Wis.

**AGENTS—Clever Invention!** Inkspoon makes every pen a fountain pen. Fast office seller; big profit, demand increasing everywhere. Exclusive territory offered. Sample free. H. Marui Company, Tribune Bldg., New York, N. Y.

**MAKE** And sell your own goods. No machinery. Guaranteed formulas. Catalog free. Clover Laboratories, (E) Park Ridge, Ill.

**A BUSINESS** of your own—Making sparkling glass name and number plates, check-boards signs. Big book and sample free. E. Palmer, 512, Wooster, Ohio.

**PORTRAIT Men:** Why not Pasco portraits? We refund your money for all you cannot deliver. Frame catalog free. Portrait Agents' Supply Co., Dept. F, La Porte, Ind.

**SUCCEED** With your own products. Make them yourself. Formulas, processes, trade-secrets. All lines. Catalog, circulars free. B. Thaxly Co., Washington, D. C.

**\$50.00 WEEKLY** Easy, applying gold initials on automobiles. No experience needed, \$1.45 profit every \$1.50 job. Free samples. "Ralco Monograms," X1043 Washington, Boston, Mass.

**REPLATE** Brassy worn-off automobile parts, reflectors, bath room fixtures, worn spoons, forks, etc., with pure silver. Looks like new. Use U-Kan-Plate Polish. Positively no mercury. \$1.00 half pints. Post paid. Satisfaction guaranteed. Agents wanted. Dept. A, U-Kan-Plate Co., Philadelphia.

**WORKERS** Buying and applying Axtell Metal Weather Strips to door bottoms make \$1.00 to \$3.00 hourly. Prices, territory, etc. E. L. Church Co., Whitman, Mass.



**GET** Our free sample case—Toilet articles, flavorings and specialties. Wonderfully profitable. LaDerma Co., Dept. A, St. Louis, Mo.

**SELL** Men's neckwear; wonderful proposition. Astor, 318-M Broadway, New York.

**AUTOMOBILE** Specialties. Guaranteed formulas for all latest money makers. Lowest prices. Write for free lists. Murphy, Chemist, Tujunga, Calif.

**AGENTS**, Our cigar lighters and sales-boards sell quick. Large wholesale catalog free. Joseph Sales Company, 223 Madison St., Chicago.

**GOLD-LEAF** Sign letters; copyrighted manufacturing instructions; profits 1,000%. Johnston Co., Quincy, Ill.

**\$1,000.00 REWARD** If this is not the greatest money-making house to house proposition ever known. N. R. G. tablets wash clothes in 10 minutes without rubbing. Free samples. N. R. G. Co., H 500 W. Division, Chicago.

**TWO** Money makers for agents. "Francia" Pocket Adding Machine retails \$4.85. To you \$1.00. "Excellograph" Rotary Stencil Duplicator \$37.50 retail. Write Typewriter Supply, 102 Hersch Bldg., Pittsburgh, Pa.

**POLMET** Polishing Cloth removes tarnish from metals without the use of liquid, paste or powder. Our agents say it sells like "hot cakes." Retail 25c; sample free. Gale & Co., Inc., 15 Edinboro St., Boston, Mass.

**OUR** Luminous Crucifix Shines in the Dark. Every one amazed at the wonderful effect. Easily demonstrated—easily sold. W. G. Hannan Co., 2543 So. State St., Chicago.

**AGENTS**—Engraved name plates, signs, numbers, etc., easily sold, profits large. Brett Bros., Roxbury Crossing, Boston, Mass.

**CALIFORNIA** Perfumed beads selling like hot cakes. Agents coin money. Big profits. Catalog free. Mission Factory P, 2328 W. Pico, Los Angeles, Calif.

**"HOW** to Secure Agents," a specially prepared booklet, tells of one of the most inexpensive methods in which to secure good live producing agents. It is free; write for your copy today! M. L. Rund, Mgr. Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago, Ill.

**32 SECONDS** Complete tire change by Detmer, Ohio, with Morey Quick Action Rim Tool. Sold, singly, 49 three days, cleared \$100. Anderson, Mont., sold 1,400 in 14 weeks. Get details for good territory. Harvest time now. M. Morey Rim Tool, Buffalo, N. Y.

**\$12.00 DAILY** Showing new table cloth. Looks like linen. Wash like oilcloth. No laundering. You just take orders. We deliver. Pay daily. Sample free. Bestever, 152 Irving Park Station, Chicago.

**PORTRAIT** Agents make more money than any other class of agents. Write for our new catalog—Portrait enlargements, medals, etc. Adam J. Kroll & Co., 2543 South State St., Chicago, Ill.

**SOMETHING** New! Every motorist buys our Electro Magnetic Emergency Wonderlamp. One minute's demonstration makes a sale. Experience unnecessary. \$5 an hour easily made. Full time or evenings. Write for sample. Wonderlamp Co., Flisk Bldg., Dept. 10A, New York.

#### HIGH-GRADE SALESMEN WANTED

**FEW** \$1,000 Monthly earnings ads are truthful. Our men actually earn \$300 to \$500 regularly selling our lines. Adolite, the newcomer in electric window salesmen, is making a big hit. More for the money than anybody gives. Business posters for every line. Changeable letter system too. Permanent business for you working with us. Territory protected and repeats credited. Fat commissions. Full details will prove very interesting. Display Products, Ltd., 409-A East 31st St., Kansas City, Mo.

**SALESMEN**—Become independent. Own your business; experience unnecessary, selling our \$10,000 Accidental Death; \$50 Accident; \$25 Sick Weekly Benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady income from renewals. \$250,000 deposited Insurance Department. Universal Policy, Dept. A, 10 Clinton St., Newark, N. J.

**TRAVELING** Salesmen, chance for permanent connection with leading specialty manufacturer. High commissions year round. Box E-222, Boonville, N. Y.

**ADVERTISING** Plan boosts sales; pays tailoring salesmen \$100.00 weekly. Powerful line. All wool union made-to-measure suits and topcoats, \$23.50-\$31.50-\$39.50. Big repeat business. Liberal bonus plus commissions. 100 beautiful swatch line free. W. Z. Gibson, Inc., 500 Throop, Dept. D-517, Chicago.

**\$10-\$20 DAILY** Selling printed stationery and new advertising specialties, blotters and envelopes. Good sideline. Liberal commission. Free sample outfit. Embograt, 4558-62 Elston, Chicago.

**BIG** Money taking printing orders. Ship everywhere. 43 standard items for business men. Low prices. Hundreds free cuts. Quick sales, repeat orders. 40% commissions. Outfit, complete instructions free. Kaeser & Blair, Dept. 82, Cincinnati, Ohio.

**THE** Health sponge, new patented article just out. Making big hit. Sells for 50c. Sample 35c. Details free. B. C. Meister, Methuen, Mass.

**CANVASSERS**: Stop! Look! Listen! Mexican curios, den fixtures, Indian rugs, feather work. Fastest selling goods. Full particulars, samples fifty cents. G. Medina, 78-P LaRosa St., Mexico City, Mexico. Highest references.

**SALESMEN** Wanted to sell and manage territory for the Venus Motorless Hair Dryer. Something new. For details write Lewis & Freeman, 5320 St. Clair Ave., Cleveland, Ohio.

**WORLD'S** Finest union printing! Quick delivery! Big commissions advanced. Experience unnecessary. Largest cut display. Outfit and business stimulator free. Northwestern Printing, 2002 Division, Chicago.

**SALESMEN**—Earn \$100 weekly taking orders for Dazzler and Rainbow glow electric signs. Big commission. Exclusive territory. High grade proposition. Write Chicago Sign Sales Co., Dept. 63, Charlotte, N. C.

**SALESMAN** Wanted for new hand soap. Must have car for deliveries. Work near home, not house to house. No experience needed. Connecticut Can Co., Hartford, Conn.

**SIDELINE**—New! Quick seller to merchants, banks, manufacturers. Full commissions daily. Pocket sample free. Carroll Co., 319 N. Albany, Dept. 346, Chicago.

**SALESMEN**, Calling on manufacturers, department stores, institutions, schools, etc. Sell the building superintendent a giant pump, guaranteed product, removes stoppages in plumbing pipes. \$5.00 commission on each sale. Regular terms, may be placed on trial. No samples. Pocket selling outfit free. J. E. Kennedy Corporation, Dept. 14-L, 79 Madison Ave., New York City.

**SELL** Printing; experience unnecessary; main or sideline. 40% commission advanced; copyright cuts and elaborate outfit free; beats all competition. Meyerson, Y1132 So. Racine, Chicago.

**A** PAYING position open to representative of character. Take orders shoes-hosiery direct to wearer. Good income. Permanent. Write now for free book "Getting Ahead." Tanners Shoe Mfg. Co., 2004 C St., Boston, Mass.

**POOL** Shooter, new, fascinating vending machine. Merchants everywhere buy! Side-line men make \$200 weekly! Free pocket outfit! Specialty Mfg. Co., Dept. 1, 617 W. Division, Chicago.

**FURNACE** Coal saver. Reduces smoke and soot and coal bill. Easily sold and installed. Big money for hustlers. The Campbell-Hausfeld Company, Box 9, Harrison, Ohio.

**BUSINESS** Stationery: Largest line, highest quality, quickest delivery, biggest commissions. Liberal bonuses. Free copyrighted cuts every business. Experience unnecessary. Instructions and outfit free. David Lionel Press, Dept. 34, 406 S. Sangamon, Chicago.

**SALESMEN**—Don't look further. Here is what you want for 1929. Best staple necessity to sell garages, oil stations, accessory stores. Always in demand. Liberal commission. Best co-operation. Our proposition will surprise you. Write today for particulars to Box 197, Spencer, Iowa.

**\$78.00** MADE BY Iowa salesman first day selling new hot dog machine at \$18.50, commission \$8.50; direct factory connections. Leonard E. Dickerson, Dept. E-11 Springfield, Mo.

**SALES** Workers—With mechanical inclination, to place Air-Lec Door Operators; should have car; a short training and demonstration will be given you in your territory; good commissions begin immediately. Write Schoelkopf Mfg. Co., Madison, Wis.

**SALESMEN**: Manufacturer and distributor one of country's leading lines automotive shop equipment and hand tools offers exclusive territory. Proposition assures good income; advance against commission basis. Applicants must be financially responsible, have some knowledge of tools and must own car. Write for proposition to Mr. Merrell, Woods Organization, Inc., 37 W. 20th St., New York, N. Y.

**SALESMEN**: Sell Bostonian shirts direct to wearer. We will start you in a money-making business of your own without a penny of capital. No experience necessary. Wonderful complete selling outfit free with everything you need to start collecting your profits at once. Write today, sure! Bostonian Mfg. Co., 106 Bickford St., Boston, Mass. Est. 1863.

**Oh** What a sideline. Gigantic money-getter. \$4.00 commission every \$5.00 sale. Collects accounts so fast—storekeepers, doctors get dizzy. Brooks, Texas, sold (20) first day—commission \$80.00. We deliver and collect. Full commissions all reorders. Sample free. Federal Association, Hartford, Conn.

**SELL** Printing. Commission in advance with or without deposit; 48 hour service. Write for outfit. E. Willis Printing Co., 5939 Wentworth, Chicago.

**LIVE** Wire salesmen for auto specialties. Sell direct or to the trade. Liberal commission. Write now for available territory. Davis Specialties Company, Box 131, Station A, Worcester, Mass.

**EVERY** Car-owner and garage a prospect. New \$2.00 puncture finder; beats tub, no leak too small; a few ounces lasts a lifetime. Sample \$1.00. P. J. O'Sullivan, 546 8th St., Brooklyn, N. Y.

**AUTOMOBILE** Specialty tool salesmen. Wonderful new valve lifter for all the latest motors. Quick sales, big commissions. Clark-Feather Mfg. Co., Fort Morgan, Colo.

**MAKE** \$10 To \$50 daily placing advertising, selling Penny Day Accident Policy. \$7,500 maximum benefit. \$100 monthly indemnities. Guaranteed income from renewals. American Benefit Corp., Mgrs., Myer Bldg., Springfield, Ill.

**SELL** Men's neckwear; wonderful proposition. Astor, 318-D Broadway, New York.

**EARN** \$20 A day. Establish income for life selling for \$1 a year \$1,500 accident policy. Write W. C. Stone, 11 So. LaSalle, Chicago.

**SALESMEN**—Make big money handling our advertising "Twin Pencil"—unique novelty; just out. Large commissions to experienced men. Multipoint, Corona, N. Y.

**BIG** Pay every day taking orders for dress and work shirts, pants, overalls, sweaters, underwear, hosiery, pajamas, playsuits! Experience unnecessary. Outfit free! Nimrod Co., Dept. 65, 4922-23 Lincoln Ave., Chicago.

**NEWEST**, Finest and most complete line of novelties and pencils for 1929. State experience. Advertising Novelty Company, Newton, Iowa.

**STATE** Mgr. Marvelous invention seals 3,000 envelopes hourly! Sells \$4.50 only; equals work expensive electric machines. Offices buy 1-100. Exclusive territory. Opportunity earn \$7,000 yearly. Free trial offer. Write quick! Rede, 30 Winthrop Bldg., Boston.

**SALESMEN**, Wonderful sideline. 40% commission paid daily. Sells all merchants. Pocket outfit free. Willens Co., 941 VanBuren, Dept. 203, Chicago.

**WONDERFUL** Invention. Seals fifty envelopes minute. Sells on sight at \$3.50. Attractive proposition. Square deal. Bank references. Kendall Sealer Co., C-10 East Jaffrey, N. H.

**EVERY** Home a prospect. Make big money. Take orders tree, shrubbery. Experience unnecessary. No dull season. Commissions paid weekly. We deliver, collect. Write Perry Nurseries, Dept. R-4, Rochester, N. Y.

**PUNCHBOARD** Salesmen. \$10,000 yearly. New line. All fast sellers. Lowest prices. Full commission on repeat business. Catalog free. Hurry! Puritan Novelty Co., 1409 Jackson, Chicago.

**PICK** A winner! \$200 every week. "Seven-Eleven" dealers wild about it. Every cigar counter waiting. 31 other sellers. Rudy, 339 Madison, Chicago.

**IT'S** Legal. New and aplenty different! "Gypsy." It's whirling wheels fascinate everybody. Merchants buy eagerly. Clean up \$100-\$150 weekly. Dept. 18, Cigar Stores, Peoria, Ill.



**SALESMEN**—\$4 in your pocket every half hour. Write orders for Hollywood News. New idea advertising service for store windows. No competition; every store prospect. Permanent repeat business. Free sales outfit. Retail Stores Service Corp., 1165 Broadway, Dept. J2, New York.

**WOW** Of a sideline! Make \$200 monthly extra. Show new, exclusive line coveralls and shop coats. Advertising embroidered on back. Every business prospect. Outfit free. Master Co., 4734 Dorchester, Dept. A-4, Chicago.

**NEW Invention**—Sells every business. Used by Bell Telephone, Armour, etc. Four \$15 sales daily pay \$288 weekly. Write quick for exclusive territory. Adjustment Service, Dept. PM, Mobile, Ala.

**THEATER Ticket** selling charts, shows total price of any number tickets sold at any price; mistakes impossible; sample set \$1, retail \$3. P. S. Nielsen, LaMoure, N. Dak.

**\$100.00 WEEKLY** Selling new tooth whitener to stores. Quick sales. Big repeats. Write or wire Terrell Products Company, Martin's Ferry, Ohio.

**\$18 TO \$25 Daily**; biggest selling line of 2-piece suits, \$9.95 and \$12.50; 3-piece wool suit, \$17.95 (regular \$28.00 value). All-wool overcoats \$18.50. Splendid raincoats, slickers and boys' suits. Biggest commission. Free outfits. "Jim" Foster, Inc., Dept. 24, 2250 S. Spaulding Ave., Chicago, Ill.

**JUST Out!** Amazing new vending machine! Pays merchant 1,600% profit! Sensational wherever introduced. \$50.00 daily! Dept. 9, Acme, 37 W. VanBuren, Chicago.

**SCREW-HOLDING** Screw driver! Amazing brand new patented invention! Retail \$1.50. Factories, garages, electricians, auto, radio owners buy on sight! Exclusive state territory. Genuine opportunity earn big money. Free trial offer. Jiffy, 1059 Winthrop Bldg., Boston.

**SUCCESS** Is no accident! You will fully understand this slogan when you examine our automatic credit and collection plan. Copyrighted, brand new, unusual. You make 250% on original sale. Half cash on repeats without call-backs. Commonwealth J. Publishing Company, 508 So. Dearborn St., Chicago, Ill.

**DON'T Sell** for others. Employ agents yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable booklet free. National Scientific Laboratories, 1984 W. Broad, Richmond, Va.

**SALESMEN**: New line, new prices, bigger slice for you. America's best known, biggest value suit line. Something extra for producers. Write J. B. Simpson, 843 Adams, Dept. 1610, Chicago.

**FREE**—1,000 Money-making opportunities from reliable firms. Sample copy free. Specialty Salesman Magazine, 4201 Mather Tower, Chicago.

**COVERALL Salesmen**—Make \$20 daily selling new \$3.50 improved coveralls, also service coats with customer's name embroidered on back. Unusual construction. Commission 75c. Wonderful advertising value. Lowest priced; highest commission. Free outfit. Am. B. Co., B-329 W. Monroe, Chicago.

**SELL Printing**: 40% commission daily. Lowest prices, with or without deposit. Copyright cuts free. Inquiry brings pocket outfit. Salesmanager, 1522 Wells-VanBuren, Bldg., Chicago.

**SELL Nothing!** \$170 weekly empty handed. Punchboard headquarters announce amazing new plan. No investment. We even pay express. K&S Sales Co., 4378 Ravenswood, Chicago.

**GOLD Leaf Window Letters** and script signs; no experience; 500% profit. Samples free. Dearman made \$19.20 first 2 hours. Consolidated, 69-V West VanBuren, Chicago.

**SIDELINE Men wanted**—Tell us what you sell, your territory. References. We manufacture over a thousand novelties and can always give you a line. Reliable house, 25 years in business. Bradford & Company, Inc., St. Joseph, Mich.

**\$60-\$200 A WEEK**. Genuine gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-A North Clark, Chicago.

**ADVERTISING Salesmen** in every state. Year around position, selling merchants and manufacturers, booklets, calendars, novelties. Commissions weekly. Plenty repeat business. Matson Pub. Co., Main St., South Whitley, Ind.

**PUNCHBOARD Men!** Sideline salesmen! Sensational merchandise catalog just added to famous "Lincoln Line"! No more closed territory! \$200 weekly. Easy repeat commissions paid daily. Smashing color catalog free. Samples unnecessary. Best season now. Get busy! Lincoln Sales, 9 So. Clinton, Chicago, Dept. D.

**PUNCHBOARD Salesmen**. \$200 weekly. Liberal plan assures sales. Latest assortments. Nothing to carry. Full commissions on repeats. M&L Sales Co., 301 W. Adams, Chicago.

**SALESMEN**—Four \$15.00 sales to merchants net you \$40.00 daily. Snyers Systems, 2812 Sheffield, Chicago, Ill.

**SALESMEN**—\$75-\$100 Weekly selling high grade signs, calendars, fans and novelties; full or part time. Big commissions paid promptly. Sample outfit supplied. Write today. Scioto Sign Co., Dept. L, Kenton, Ohio.

### HELP WANTED

**MEN**: Few dollars starts profitable business of your own. No selling. Reliable firm. Details free. Write now. Manager, Central Office, 56, Akron, Ohio.

**YOU** Are wanted to resilver mirrors at home. Immense profits plating autoparts, tableware, etc. Write for information. Sprinkle, Plater, 287, Marion, Ind.

**SILVERING Mirrors**. French plate, patented process, easily learned. Immense profits. Plans free. Wear, Excelsior Springs, Mo.

**THE Boulder dam**. Eight year's work. Latest information regarding conditions, employment, concessions, etc., sent by return mail for \$1.00. Money back if dissatisfied. M. Roberts Service Bureau, Box 1051, Denver, Colo.

**BETTER Jobs** are easy to get anywhere. Send stamp for free advice. A. Allard, 4724 Des Erables, Montreal, Can.

**ARE You old at forty?** See our advertisement on page 84 of this issue. The Electro Thermal Company, 2116 Morris Ave., Steubenville, Ohio.

**OBTAIN Employment!** Get positions you want, quickly, anywhere. Use clever "Ways That Win." One person was offered 70 jobs! Complete methods, 50 cents. Money promptly returned if wanted. New Idea Service, Box 39-1, Station K, New York.

**CASH Paid** for Butterflies, Insects. See Sinclair Display Advertisement on page 24.

### EDUCATIONAL AND INSTRUCTION

**PENMANSHIP** Courses by mail. Write today for free folder. Your signature written six beautiful styles if you enclose 10c. Meub, Penmanship Specialist, 1944 Loma Vista, Pasadena, Calif.

**DON'T Prepare** for any civil service examination without seeing our catalog. Free. Columbian Correspondence College, Washington, D. C.

**FIREMEN**, Brakemen, baggagemen (white or colored), sleeping car, train porters (colored), \$150-\$250 monthly. Experience unnecessary. 810 Railway Bureau, East St. Louis, Ill.

**WORK For "Uncle Sam."** Government jobs. Men-women, 18 to 50. \$105.00 to \$283.00 month. Steady, pleasant work. Short hours. Paid vacation. No layoffs. Common education usually sufficient. Candidates coached without leaving home. Full particulars and 32 page book free. Write immediately. Today sure. Franklin Institute, Dept. P3, Rochester, N. Y.

**ABDOMINAL Control**—Complete course, weight reducing body building. Constipation chapter revelation, sold world over for \$3.00. Now complete, postpaid \$1. Order today. John Hernie, 12E. E. 37th, New York.

**FREE Booklet** Elijah Is Coming. Specialty Sales, 1102 Flanders, Rochester, N. Y.

**BECOME A cosmetic chemist** at home, in few weeks. Earn \$50 to \$200 a week. New profession. Diploma issued. Positions everywhere. National School of Cosmetic Chemistry, 2985 West 15th St., Los Angeles, Calif.

**DO you like to make things?** If so, you should have a copy of Popular Mechanics new book entitled "Make It Yourself." A large book of 480-pages describing how to make 900 different articles. 823 illustrations. Price \$3 postpaid. A full description will be sent upon request. Popular Mechanics Press, Room 804, 200 E. Ontario St., Chicago, Ill.

**BOOKKEEPING** Easily learned. B-1113 Denrike Bldg., Washington, D. C.

**MEN**—Boys, 18 up. U. S. government life jobs. \$105.00 to \$280.00 month. Steady work. Paid vacations. Common education usually sufficient. Valuable book with list positions, sample coaching and particulars free. Write immediately, today. Franklin Institute, Dept. P14, Rochester, N. Y.

**EARN Big money** drawing. New \$1.00 a lesson plan. Send for first lesson or write Integral School of Commercial Art, Melrose Park, Ill.

**MANUSCRIPTS Wanted**. Stories, articles, poems. Write for particulars. Sachs, 2533 Park Ave., Cincinnati, Ohio.

**WANTED**—Boys-men. Become auto mechanics. Sample training free. Franklin Institute, Dept. P400, Rochester, N. Y.

**MANUFACTURE** Novelties, patterns; instructions, including scroll saw, \$1.00. Borgen, 2264 Hermans Ave., New York.

**LEARN Clothing** designing. Big pay; simple mail course; low cost. Garment Technical Inst., 216 E. 45th St., New York.

**SIMPLIFIED** Light-line shorthand book 25c. Marr, B605, Nashville, Tenn.

**AMATEUR Cartoonists**: Sell your cartoons. New market. Smith's Service, PR-1194, Wenatchee, Wash.

**DOUBLE Entry bookkeeping** 60 hours with 8 keys; guaranteed. (Diplomas.) International Bookkeeping Inst., 8 Springfield, Mo.

**\$400 TO \$700 Monthly** selling real estate my way. We qualify you for a real estate expert or refund your money. Write for free booklet. National Real Estate Institute, Dept. 600, Fort Smith, Ark.

**LINOTYPE** Operating easily learned; home or college; small cost; big wages. Free catalog. Linotype Institute, Maumee, Ohio.

**STUDY A scientific profession**. Microbiology. Bacteriology. Sanitation. Extension-residential course. Diplomas degrees granted. Urinalysis outfit-prospectus free. College of Microbiology, 722 Calumet, Hammond, Ind.

**TRACE Missing people**. Excellent paying work. Open to all. Write National Headquarters, 169 East 83rd, New York.

**BECOME A landscape architect**. Uncrowded profession; wonderful opportunity for money-making. Easily mastered by mail. Earn while you learn. Est. 1916. Write for details. American Landscape School, 29 Plymouth Bldg., Des Moines, Iowa.

**BIG Money** in photography, motion picture projection. Catalog 49A free. New York Institute of Photography, 10 W. 33d St., New York.

**WANTED** Immediately, men-women, 18-55 qualify for government position, \$125-\$250 month. No experience required. Steady work. Vacations with full pay. Write, Ozment Inst., 101, St. Louis, Mo.

**U. S. GOVERNMENT** wants men, \$1,700-\$1,900 and up at start. Railway mail clerk examination coming. Let our expert (former government examiner) prepare you for this and also rural carrier, post office, customs, internal revenue, and other branches. Write today for free booklet. Dept. 8, Patterson School, Rochester, N. Y.

**BIG Demand** for photoplay and magazine stories. We revise, develop and copyright. Sell on commission. Established 1917. Booklet free. Universal Scenario Company, 406 Western and Santa Monica Bldg., Hollywood, Calif.

**OUTDOOR Opportunities**. Instructions for raising and selling rabbits, guinea pigs, milk goats, silver foxes, ferrets, white rats, white mice, dogs, cats, pigeons, pheasants, bantams, canaries, bees, frogs, mushrooms, ginseng and golden seal all profitably on town lot. Just write for "Outdoor Opportunities." Pay Postman \$2 and postage. Popular Mechanics Press, Room 804, 200 E. Ontario St., Chicago, Ill.

### INFORMATION

**10,000 FORMULAS**. A real Gold Mine of money-making ideas. Tells how to make almost everything under the sun. You can make and sell cosmetics, mucilage, anti-freeze solutions, battery solutions, beverages, cheese, chewing gum, cleaning preparations, extracts, hair preparations, inks, bluing, leather polish, mirrors, perfumes, polishes, typewriter ribbons, carbon paper, washing powders, liquid soap, and hundreds of other profitable articles. Send No Money. Just write a postal for "Hendley's 20th Century Book of Formulas." Pay postman postage and \$4. Popular Mechanics Press, 200 E. Ontario St., Room 804, Chicago, Ill.



**TRACING.** Make secret investigations. Work home or travel. Experience unnecessary. Write American System, 2188 Broadway, New York.

### TYPEWRITERS AND SUPPLIES

**TYPEWRITERS**—Factory rebuilt Royals, Remingtons, Underwoods, New Royal, Remington and Corona portables. New "Excellagraph" Rotary Stencil Dupliator \$37.50. Catalog free. Pittsburgh Typewriter Supply, Dept. 945, Pittsburgh, Penna.

**TYPEWRITERS**—All makes, \$6 to \$29. Fully guaranteed. Dee Typewriter Exchange, Manitowoc, Wis.

**TYPEWRITERS**, all standard makes, \$10 up. Fully guaranteed. Free trial. Write for complete illustrated lists. Northwestern Typewriter Exchange, 121 N. Francisco Ave., Chicago.

### PRINTING, ENGRAVING AND MULTIGRAPHING

**"NEARGRAVURE"** ("Neargravuremboso" plateless embossed) processes. Special—Neargravure 250 envelopes, 500 8½x11" letterheads \$3.33 or 8½x11" \$1.44 postpaid. Solldays, Knox, Ind.

**100 BUSINESS** Size letterheads, 100 envelopes, \$1.25. B. Crane, 1111 East 33rd, Kansas City, Mo.

**FREE**—Samples of our printing and price list. Letter Service, 4019 East 15th, Kansas City, Mo.

**1,000 FOR \$3.25**—Printed bond envelopes, blotters, check-book blotters, business cards or noteheads. 3 items \$9.00; 100 sales-books \$8.00. Alexander Selditch, 2851 W. 29th St., Brooklyn, N. Y.

**500 CIRCULARS**, 4 pages 3½x5, for \$8. Book stock; 1,000 bond letterheads \$1.00 pre-paid. Press, Jamestown, Ind.

**10,000 ELEGANT** Enamel folders, \$21.75; envelope slips, \$8.00; 5½x8½ circulars \$16.00. All printing low prices. Samples. Goodprint, Harrisonburg, Va.

**200 LETTERHEADS** And 100 envelopes, \$1.00. Sherman, Printer, Merriam, Kans.

**PRINT** Your own circulars, letters, etc., on stencil printing device—anyone can make! Samples, particulars 10c. Grinstead Company, Oswego, Kans.

**SAMPLES** Raised letter printing with special prices free. LaClyde Service, Westfield, Mass.

**GET** Our price list and samples. Moulton Press, 1410-P East 8th, Kansas City, Mo.

**BOND** Letterheads 8½x11 \$3.95m; envelopes \$2.95m; 500 letterheads, 250 envelopes \$3.00. Print anything. National Printing, Goshen, Ind.

**LETTERHEADS**, Envelopes, Circulars, Folders. Everything in printing. Bargains. Samples. Battlefield Press, Gettysburg Penna. Free battlefield souvenir.

**200 LETTERHEADS** And 100 envelopes \$1.00. 200 letterheads, 8½x11, 150 envelopes \$2.00. 250 cards \$1.00. Hoosier Print Shop, Portland, Ind.

**QUALITY** Printing! Reasonable Prices! Send for Free Standardized samples and prices. Folders, Circulars. Catalogs our specialty. Earnest Fantus, 525 South Dearborn, Chicago.

**MULTIGRAPHING** Business correspondence two dollars thousand. Hammermill letterheads, four dollars; inexpensive quality, three dollars. Miscellaneous printing. Mayera Corporation, Monmouth, Ill.

**250 BOND** Letterheads, Envelopes, Billheads, Cards, \$1.35 each. Economic Press, Leonia, N. J.

**WE** Print stationery, booklets, catalogs, circulars. Samples. Commercial Press, Batavia, Ohio.

**QUALITY** Stationery—500 8½x11 bond letterheads, 250 No. 6 envelopes, \$3.25. Samples. H. Curtis, 811 Harrigan, Kalamazoo, Mich.

**250 BUSINESS** Cards or blotters \$1.00. Stamp, sample. Gashke, 82 Washington Ave., Irvington, N. J.

**FINE** Printing—Low prices. Large modern plant (thirty employees) in small town, low operation cost. Special prices on stationery, circulars, pamphlets, ruled forms, catalogs, large or small orders. Write for samples and prices. Shenandoah Publishing House, Inc., Box 1060, Strasburg, Va.

### GUMMED LABELS

**1,000 PRINTED**: Name, business address 50c. JBS Company, Box 93, Holyoke, Mass.

**GUMMED** Labels, 500 2 lines, 35c; 3 55c, cash. Label catalog. Eastern Label Co., C. Clintonville, Conn.

### PRINTING OUTFITS AND SUPPLIES

**COMPLETE** Printing outfits, presses, type, ink, paper, supplies. Write for catalog. Kelsey Company, G-11, Meriden, Conn.

**PRINTING OUTFITS**—Presses, type supplies, type novelties. Send stamp for catalog. Model Press, York, Penna.

### RUBBER STAMPS

**RUBBER** Stamps: Name, address, two lines 35c. Three lines 50c. Newman & Son, Auburn, Nebr.

**MUSIC** Stamps, metal badge catalog 30c. Agents wanted. Walt. Karstaedt, Dayton, Ohio.

### DUPLICATORS AND DEVICES

**YOU** can make 50 to 100 copies of a letter, notice, etc., at a cost of three cents on a Hoyer Quality Dupliator. Write for free trial offer. The Hoyer Dupliator Co., 909 Jackson Blvd., Chicago, Ill.

**"EXCELLOGRAPH"** Portable rotary stencil printing duplicators \$39. Terms. Description, testimonials, printed samples, free. Pittsburgh Typewriter Supply Co., Dept. 531, Pittsburgh, Pa.

**STENCIL** Printing duplicator—Anyone can make. Particulars, specimens 10c. Grinstead Company, Oswego, Kans.

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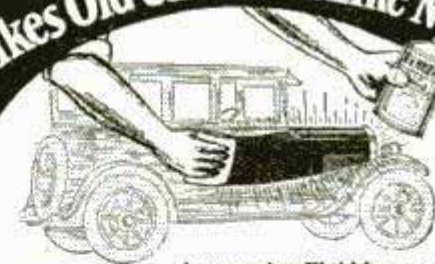
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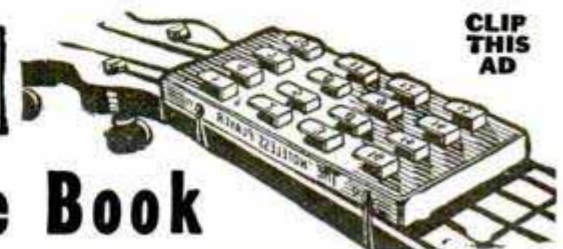


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These are the facts, just as I learned them. In 65% of all men, the vital prostate gland slows up soon after 40. No pain is experienced, but as this distressing condition continues, sciatica, backache, severe bladder weakness, constipation, etc., often develop.

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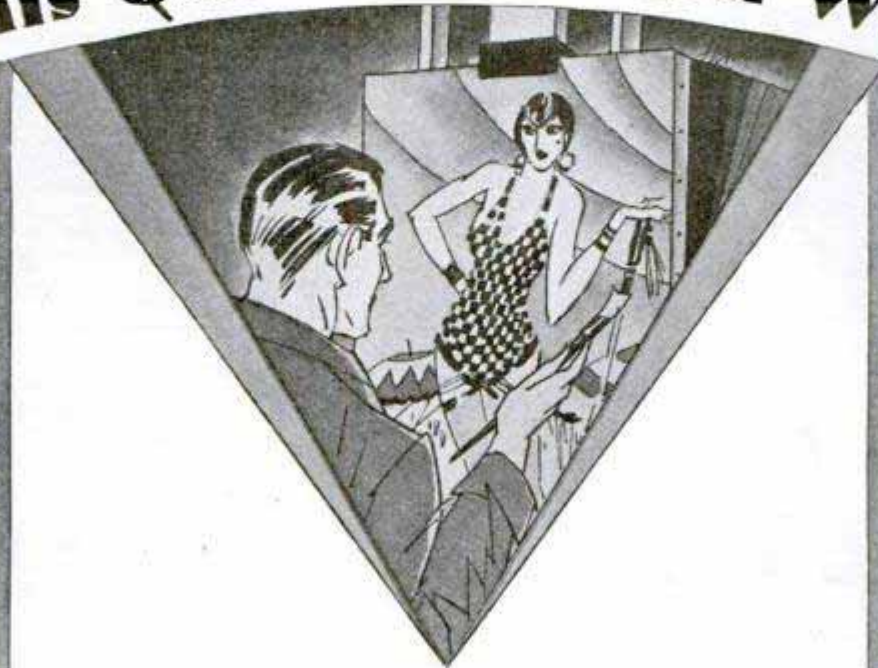
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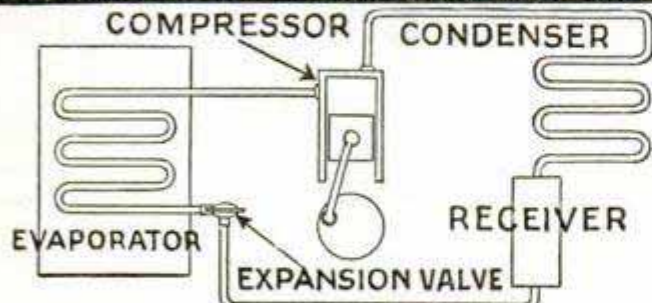
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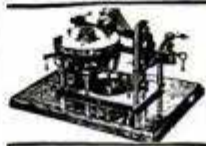
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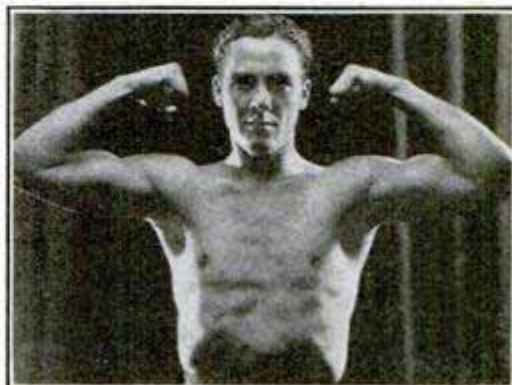


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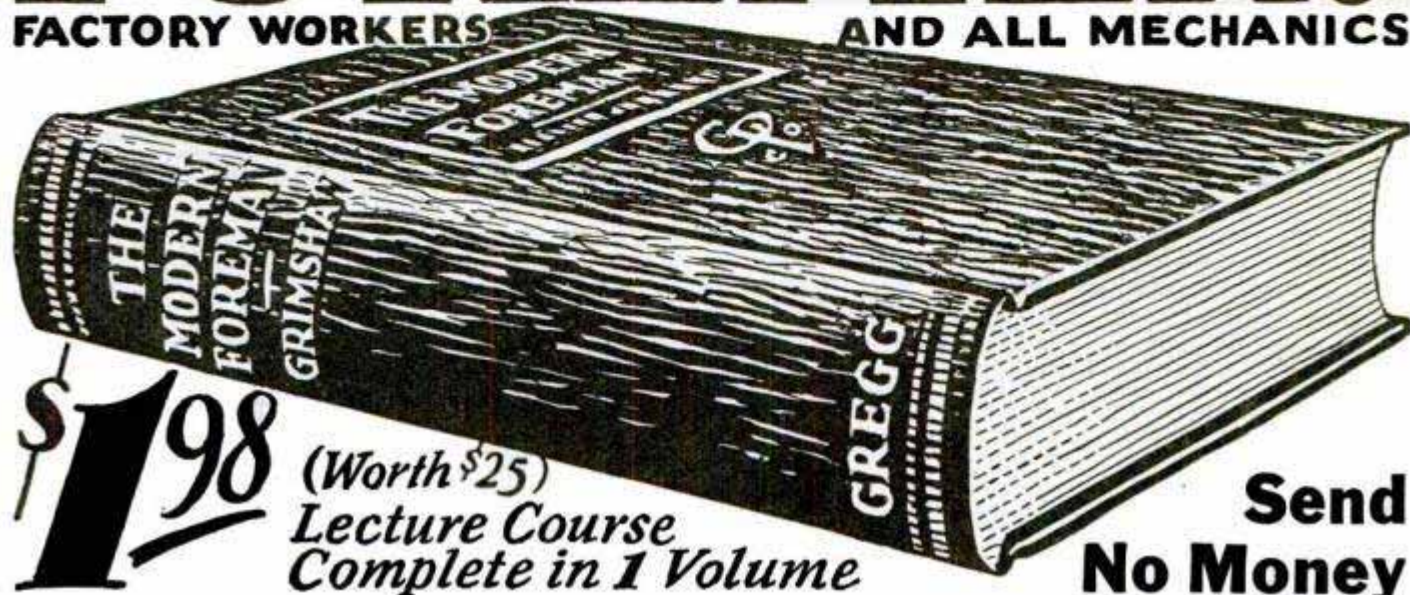
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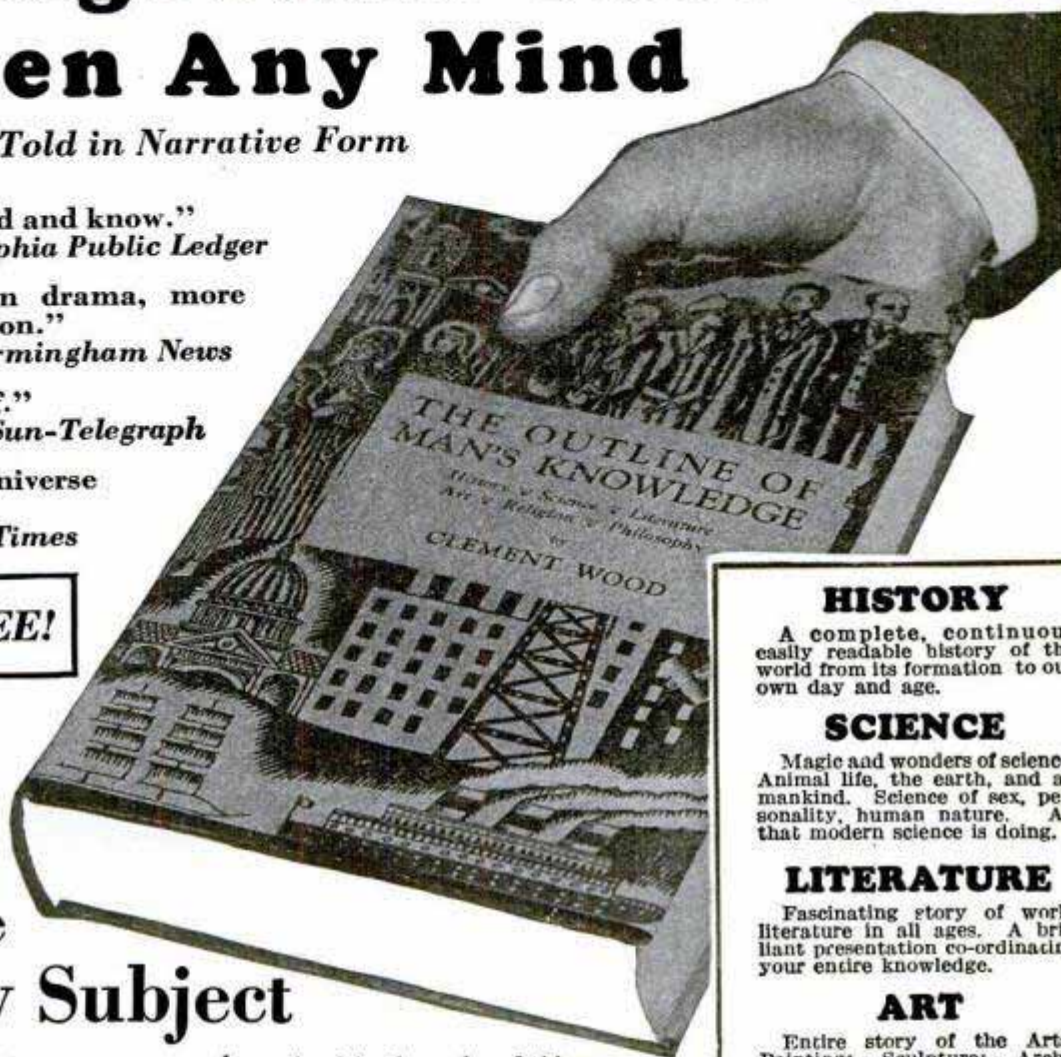
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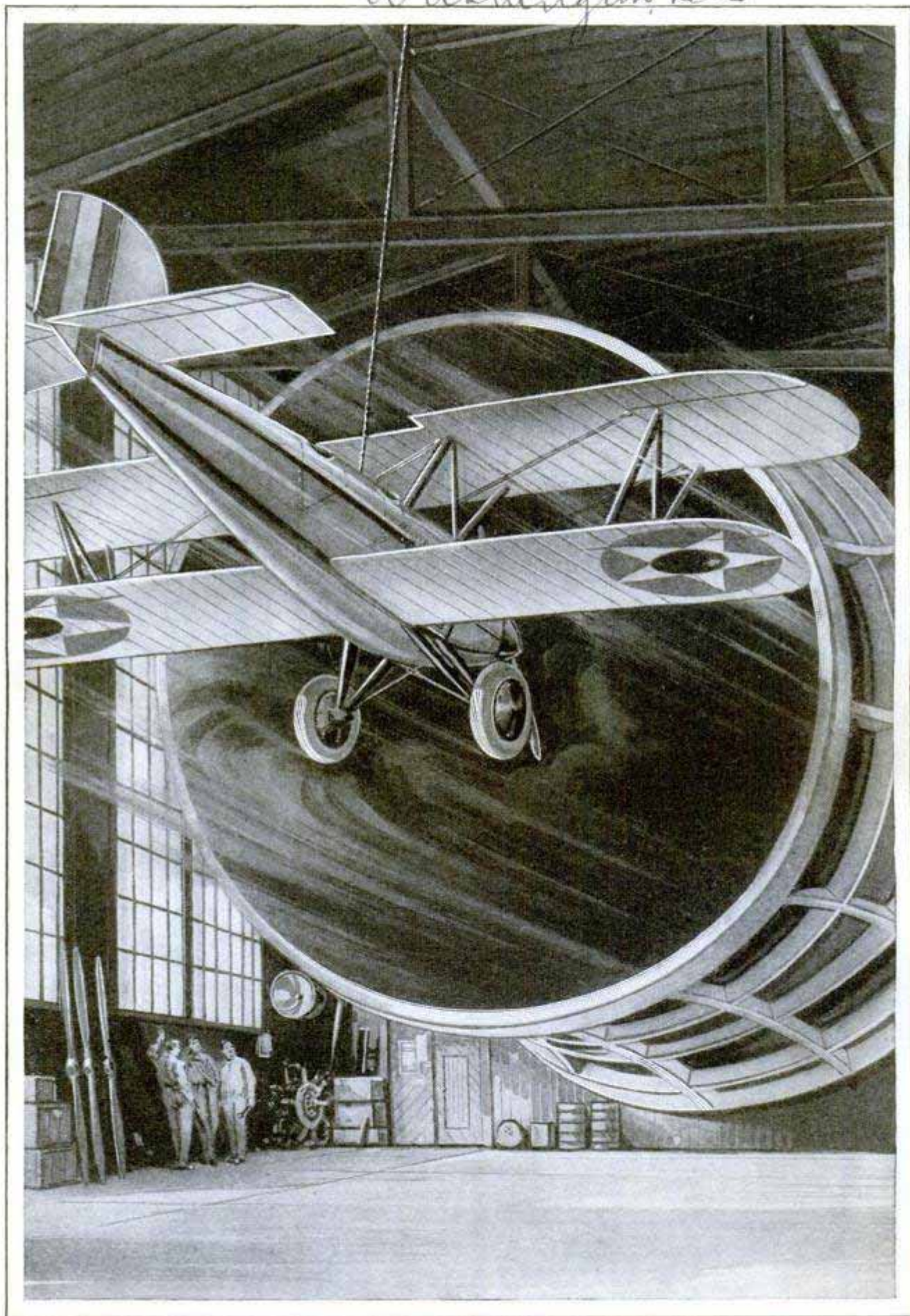
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# Popular Mechanics Magazine

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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 51

APRIL, 1929

No. 4

## The New Flying Bath Tub



A QUEER-looking device holds the spotlight at the army air corps' experimental laboratories at Wright field, Dayton, Ohio. For lack of a better name it has been called the "flying bathtub," since some of the airmen compare it to a winged variety of the household article.

The new invention, upon which Lieut. Albert I. Hegenberger, among others, has been working for over a year, was designed to take the place of what has been known as one of the most curious devices man has invented in his efforts to rival the birds of the air—the Ruggles orientator—which, placed upon the ground, is

intended to give the student flyer the "feel" of a plane long before he attempts to maneuver a ship aloft.

Made from the cockpit of a plane, it is suspended in three concentric rings. With increasing speed, the instructor, from his chair below, manipulates the plane into the desired upside-down or sideways position. Immediately thereafter, it is the student's job to maneuver the machine back again to normal. The judgment with which he does so determines in large part the rating he receives, or rather has received, since the device is now virtually obsolete.

1906 H. Sh.  
Washington D.C.

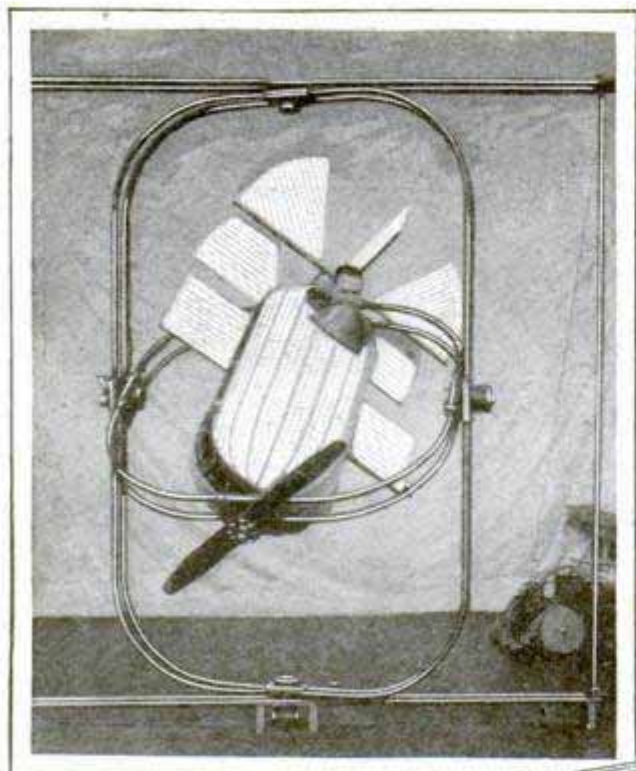
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The flying bathtub, or "primer plane" as some call it, is similar in size to the Ruggles apparatus, but the new device goes many steps beyond it. The tub contains both a propeller and an engine, and can therefore simulate to an amazing degree every one of the main maneuvers a real plane can execute.

It consists of a small fuselage body with rudder, elevator and aileron, or movable flat foil that serves to keep the ship from wobbling from side to side. These surfaces are fully controlled by the operation of standard airplane apparatus installed in the fuselage body, and the plane itself is sent flying by means of a tractor propeller driven by a fifteen-horsepower electric motor, mounted forward in the fuselage of the bathtub in the same fashion as is the engine in the actual airplane.

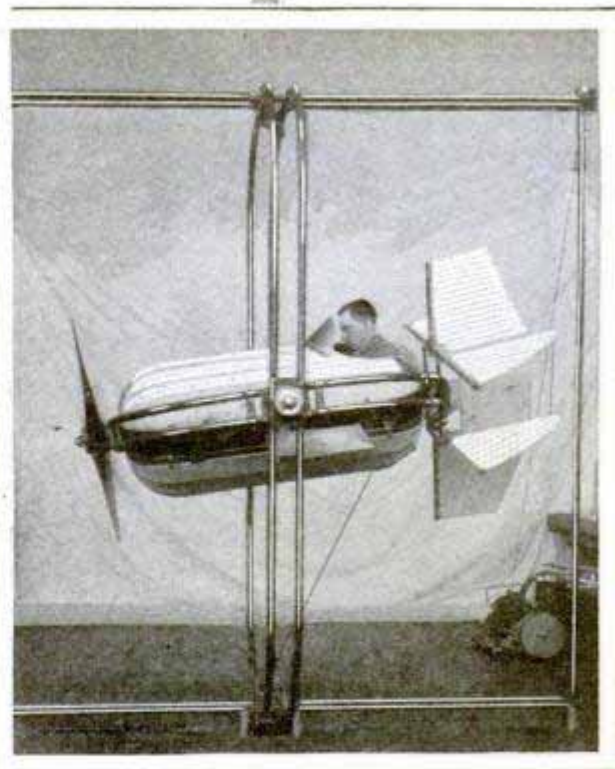
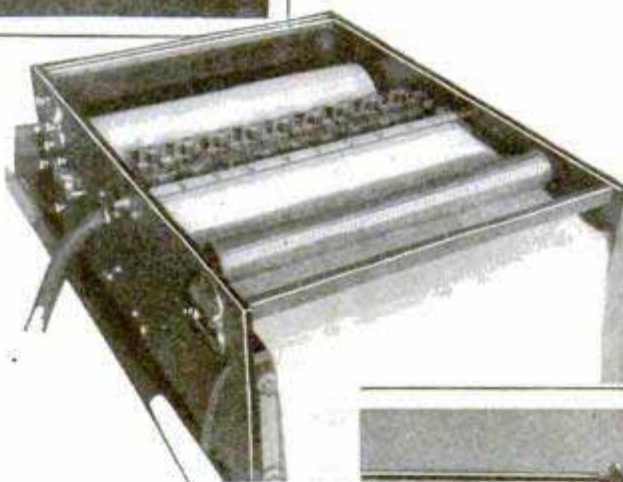
The plane itself is mounted in a double-tripod frame, twenty feet high, this height offering a sense of disassociation from the ground besides a certain amount of horizon perspective. While the student becomes familiar with the features of flying that at first are apt to be confusing—the blast of air, the noise of the propeller and

the rocking, tipping motions of flight—he also is becoming used to the response of actual flying controls.

With his feet on the rudder bar and control stick in hand, the student flyer can cause the primer plane to assume any position a plane can take in actual flight and gain the feel of the controls and the different movements of the ship with the assurance of safety while he is learning. An instrument board, equipped with compass, clock, air-speed indicator, inclinometer, bank-and-turn indicator, and the rest of the standard flight instruments, enables him to form the habit of automatic reference to the board in all attitudes of flight.

It is pointed out that, from the instructor's point of view, the device will be extremely helpful. He will be able to observe closely the student's reactions, and his natural adaptability to flying. If he notes some fault in manipulation of controls or wishes to demonstrate a certain point, then he may stop the plane at any time and give the student advice.

Then again, by



A Steep Left Spiral, Top, and a Glide, Bottom; in the Center, the Nine Pens of the Poppen Recorder, Which Automatically Charts the Results



*Capt. J. C. Miller*

*Jamaica 531  
New York*

placing a hood over the student's head, shutting off the horizon, sky and ground, blind flying may be taught by the process of having the student attempt to regain, from various attitudes, normal position by simply referring to his instruments.

*near*  
**MOUNTAIN RANGES UNDER SEA**  
**FOUND BY ECHOES** *2266*

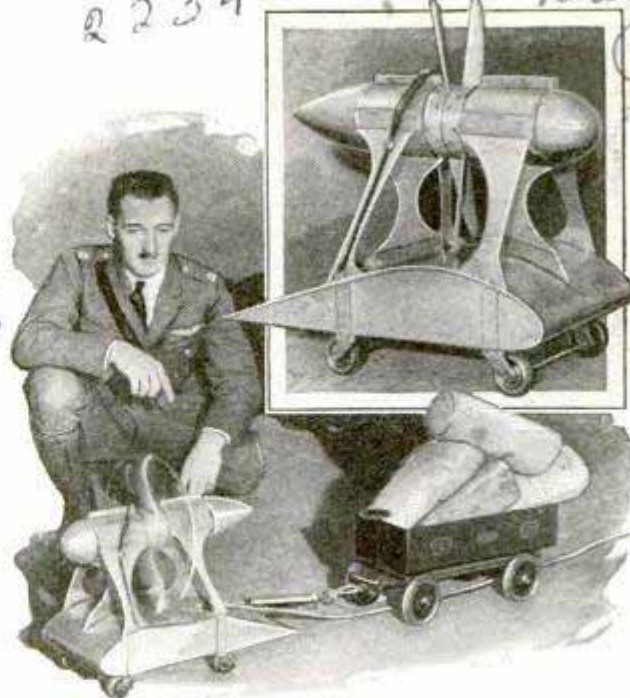
Echoes have just aided in two important marine discoveries that may help explain an ocean mystery, the origin of the Humboldt current. By firing detonating shells from a twenty-foot brass shotgun and determining the time the echoes took to return from the floor of the sea, scientists on board the non-magnetic yacht "Carnegie" have found two new ranges of mountains under the ocean. One is more than a mile high above the sea floor and 100 miles off the coast of Ecuador. The other rises to a height of 9,750 feet and runs northwest and southeast, 400 miles to the north of Juan Fernandez island. It is believed that this range may be a contributing cause to the Humboldt current and may also be a remnant of the sunken lands whence sprang the mysterious Easter Island civilization.

*New York Times 2/3/29*  
**ROTARY PLOW ON MOTOR TRUCK**  
**KEEPS SNOW FROM ROADS**

Roads around Leadville, Colo., were kept free from snow last winter by means of a rotary plow at the head of a ten-ton, four-wheel-drive motor truck. The blades of the plow were so adjusted that the snow was drawn inward and forced out through an inclined spout at the top. The truck is steered from either end, has a sheltered place for the two operators, with a small coal-burning stove to furnish heat, and when there is no snow, is used for hauling road graders and other highway units.



Motor Truck with Rotary Plow That Has Kept Colorado Roads Free of Snow



Model Plane with Double Propeller That Is Expected to Increase Power and Give Steadier Flight

**TWIN PROPELLERS ADD POWER**  
**AND STEADY PLANE**

Increased power for the airplane and steadier flying are said to be achieved with a double propeller which has been demonstrated in a small model. The two are placed within a few inches of each other and, in operation, are reported to produce a gyroscopic effect. Slots in the hubs permit changing the pitch of the blades.

**TON WOULD GO IN A MATCH BOX**  
**ON DISTANT STAR** *2277*

So dense is the material on a companion star of Sirius that a match box full of it would weigh a ton. It is 6,000 times as dense as water. This is one of the interesting facts revealed by the new telescopes. The 100-inch reflector at Mt. Wilson observatory is to be surpassed in a few years, it has been announced, by one with a 200-inch mirror and a tube probably not less than eighty feet in length.

*Prof. Arthur Stanley Eddington  
at notation of mechanical engineers*

*Similar - C. V. Edwards in Chicago  
Albert Lea*

*Used at Tennessee Pass.  
11 miles north of Leadville*

*Christmas Science  
Monitor 2/4/29*





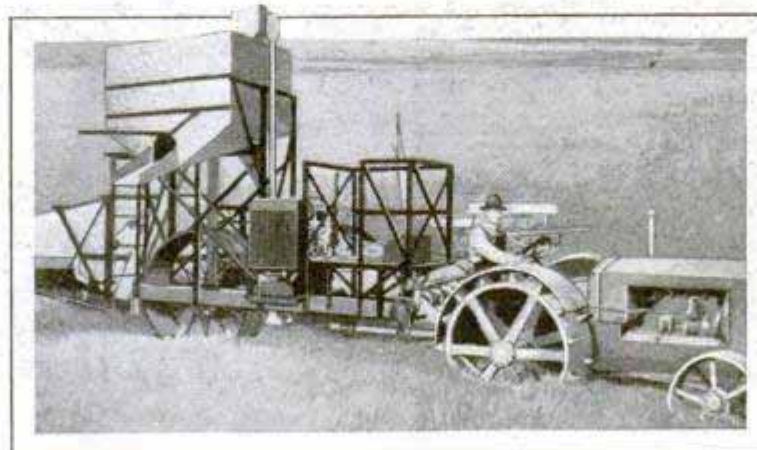
Buoy on Swimmer's Back Contains a Line and Floats, Should Wearer Sink, to Aid in Rescuing Him

### BUOY WORN BY SWIMMER AIDS IN RESCUES

So that life-savers quickly may be able to locate swimmers who have become submerged, a small aluminum float, which remains on the surface when the body sinks, has been introduced. It is attached by strong fishing line and is so arranged that it is released and the line unwound as the wearer sinks. The buoy is painted a brilliant color to increase its visibility, and the line can be used to pull the body up.

### HARVESTER FOR SMALL FARM CUTS REAPING COST

Harvesters that cut and thresh grain in one operation, until recently, have been practical only on large farms. Now, an outfit suitable for the small grower has been introduced which enables him to cut and thresh an acre of grain in less than twenty-five minutes and at an average cost of less than



Harvester-Thresher for the Smaller Grain Grower; It Cuts and Threshes an Acre in About Half an Hour

fifty cents an acre. The machine is pulled by a tractor and operated by a gasoline motor. It is compactly and solidly built, the grain being collected in a large bin at the top, from which it can be sacked or dumped in wagons. On larger farms, two or more of these outfits can be used at one time. The average farm tractor is able to pull two of them.

### EXPERT BELIEVES OLD MASTER WORKED FROM REFLECTION

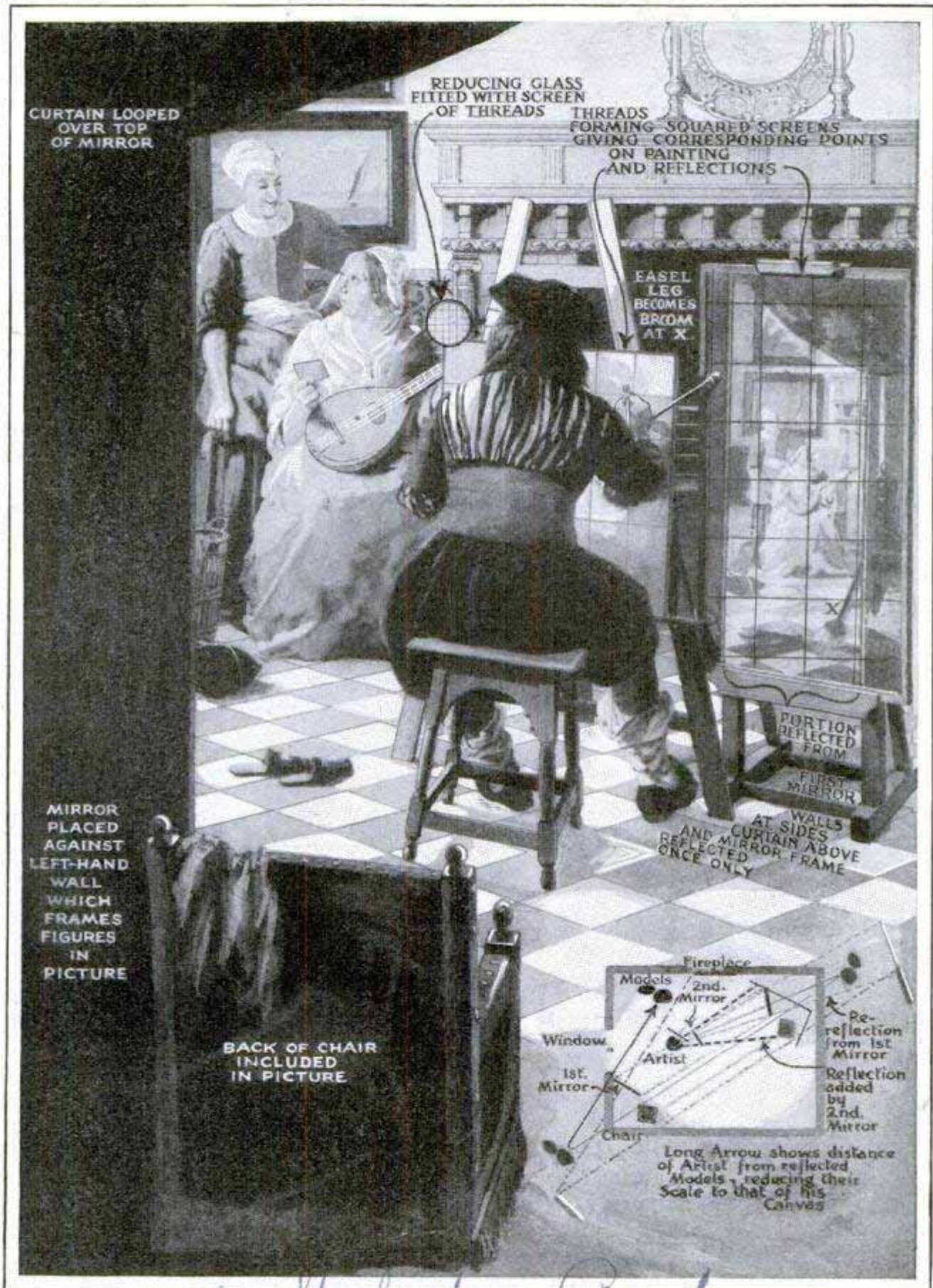
Study of the work of old Dutch painters, including Vermeer, of Delft, who lived between 1632 and 1675, has convinced Mr. R. H. Wilenski, a noted English expert, that they worked, at least in some instances, from reflections in mirrors. One of Vermeer's paintings, "The Love Letter," which hangs in the Rijks Museum, Amsterdam, has been supposed to be a picture of two models as seen through a doorway. Wilenski, however, points out that there is no sign of door and frame, and certain peculiarities of perspective in the chair on the right and the wall on the left indicate it may have been made from a reflected image. A diagram on the opposite page shows how such a picture could be painted. With such an arrangement Vermeer could paint a composite picture of the two models, and of objects which were placed behind him. The arrangement of the two reflecting mirrors would permit the artist to compose a picture in one plane before actually starting to paint, by merely moving the objects about until a suitable composition was found. A reducing glass fitted with cross threads also would allow him to auto-

matically scale the proportions. Gerard Dore used such a device. Vermeer's work is noted for the smoothness of his technique and the transparent shadows which would result from reflection of interfering light beams.

*Islander Combine Harvester Corp.*  
*Independence, Mo.*



## DID VERMEER PAINT PICTURES BY REFLECTION?



© S. W. Clatworthy.

Sketch, Showing How Noted Dutch Artist May Have Produced His Painting "The Love Letter," by Working from an Image Reflected into a Mirror at His Side.

18 Shakespeare Road,  
Hertford Hill London, S.E. 24, Eng





Cord Holder as Used When Iron Is in Operation, and Method of Attaching It to the Board

### HOLDER FOR IRONING CORD PREVENTS ACCIDENTS

Easily adjusted to almost any position, a flexible support for the cord that supplies the electric iron with current, has been introduced to help lengthen the life of the cord and to prevent accidents such as may arise from pulling the iron off the board or damaging the cord when it becomes entangled with other objects. The holder keeps the connection out of the way at all times and, when not in use, folds into a small space.

### SCRUBBING EARS TOO HARD MAY CAUSE INJURY

Here is good news for boys who object to the vigorous ear scrubbing their mothers sometimes command. According to New York medical authorities, there is danger in the process, for soapsuds and other foreign substances may be forced into the exterior auditory canal or the skin of the ear may be injured. They point out that the ear is a delicate organ and that nothing should be placed in it

in the form of a medicine except under the direction of a physician. A slight injury may develop into serious trouble, they say. In washing children's ears great care should be exercised. A soft cloth should be used for the operation. Another danger lies in blowing the nose too vigorously, because secretions may be carried into the middle ear, resulting in an infection.

### METAL COATING ON FABRICS TO AID AVIATION

Lighter and stronger airplanes are seen as a possibility in the development of a process for coating paper, silk, wood and other materials with metal by an electrochemical method. Experts point out that, if the system proves successful, planes with the strength of metal could be made from much lighter materials.

### CHURCH IS RAISED ON STILTS FOR FILLING GULCH

So that the gulch in which it was located could be filled to make a level street, a frame church in Los Angeles was recently raised twenty-four feet on a scaffolding. The structure was twenty-four by seventy feet and was elevated without mishap. Dirt was piled in around the timbers and, in a short time, the church again was resting on solid ground.



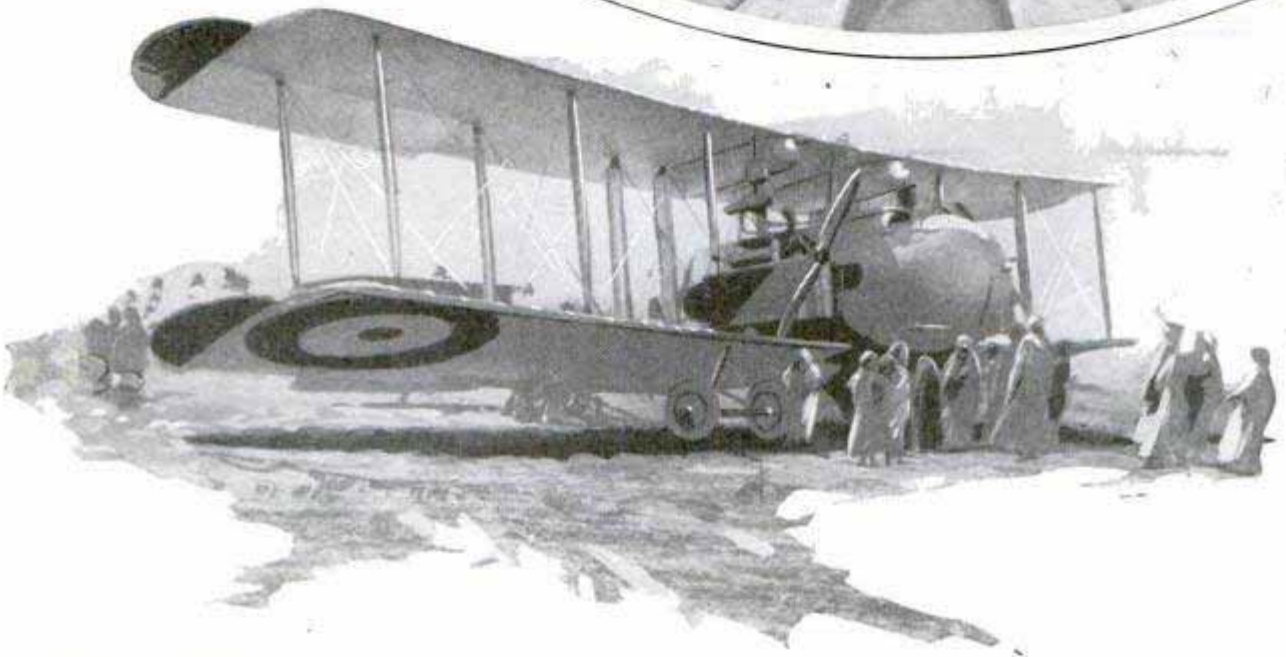
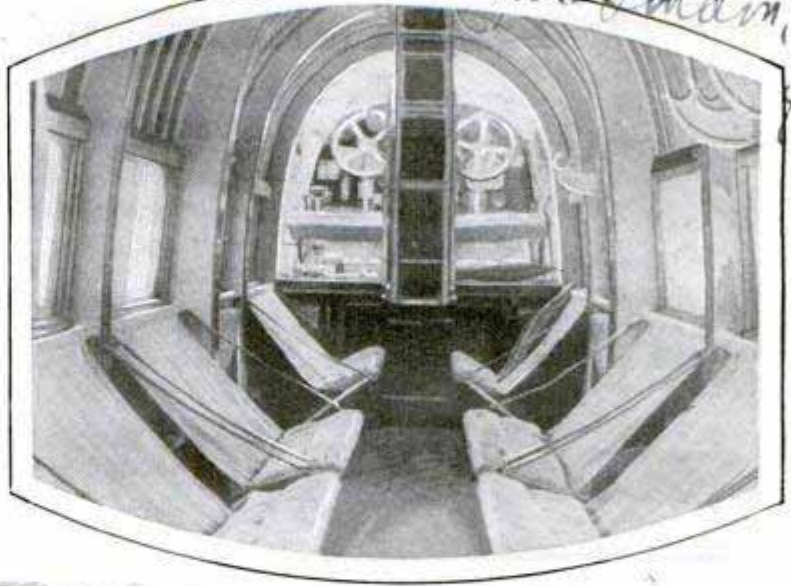
Where a Church Went Skyward on Stilts; Frame Structure Raised for Filling In, to Make Street Level

Infelsia Batista Church



**PLANE RESCUES WOMEN  
FROM BESIEGED CITY**

Women and children were taken safely from a besieged legation on the Indian frontier recently during a rebel uprising, when armed soldiers in a troop-carrying airplane went to their rescue. Infantrymen, in constant touch with forts by radio, guarded the refugees as they were taken to safety. The plane was of a special army type with a top speed of more than 100



Courtesy Vickers, Ltd.

Interior and Exterior Views of the Big Transport Airplane Used in Rescuing Women and Children from the Indian Frontier; Twenty Passengers Can Ride in One Plane

miles an hour and a cruising radius of 400 miles. A group of five such ships can

carry 100 soldiers and quickly reach districts where trouble has sprung up.

**MORE USES FOR WOOD NEEDED  
TO REDUCE WASTE**

To effect greater conservation, there should be more uses for wood, according to Dr. Julius Klein, of the department of commerce. He explains that a more efficient utilization of the material would make it more profitable for growers to plant and raise trees. At the present time, only the choicest parts of the tree are used and most of the rest is wasted or at least not used to best advantage. Chemical processing of wood, the manufacture of plywood and end-matching of lumber are among the methods that have

been developed along the line of more thorough utilization. Doctor Klein urges consumers to buy more short lumber whenever possible. Large quantities of lumber in this form are burned up each year because the mills cannot sell it. A further saving is realized in end-matched flooring. End-matched joints meet anywhere, on or between the joists or other supports so that less cutting is necessary. Development of processes for obtaining valuable by-products from wood, such as synthetic camphor, artificial silk and wood alcohol will also promote conservation and encourage tree raising, Doctor Klein points out.

Director Bureau of Forestry and

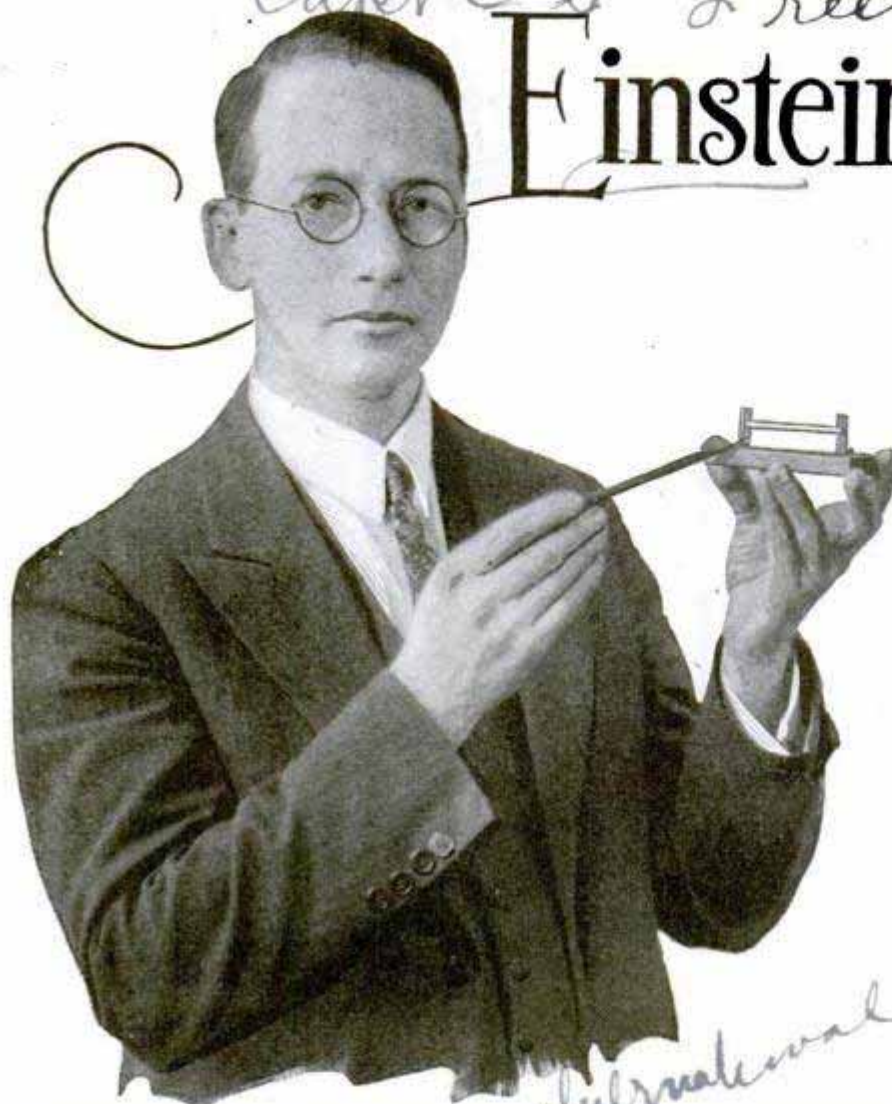
National Committee on  
Wood Utilization

U.S. Weekly 2/4/29

29, Bean Road, Beale Heath, London



2258  
Islen H. Graper Naval Observatory  
Capt C. S. Freeman



Floating in Air, Restrained Only by Celluloid Guides, the Cobalt-Steel Magnet Bar Conquers Gravity through Magnetic Repulsion

A NEW form of geometry, providing equations which may furnish proof that there is only one substance in the universe, has been developed by Prof. Albert Einstein. Fitting in between the Euclidean geometry, familiar to every school boy, and the Riemannian geometry used by Dr. Einstein in working out his famous theory of relativity, the new mathematical laws which he now proposes go a long step farther in extending the natural results of relativity.

For his new equations are based on the assumption that gravitation and electricity are the same thing. That heat and light are related was discovered early in the history of mankind. That heat and energy were related was discovered next—a discovery that was for a long time doubted, though now every form of engine is based on it. One by one science proved the in-

terrelation of light, heat, energy, matter, space, time, gravitation and electricity, until only one factor was left—the specific relationship of the last two. And, if the new Einstein equations stand the test of scientists, it will be proved they are the same thing.

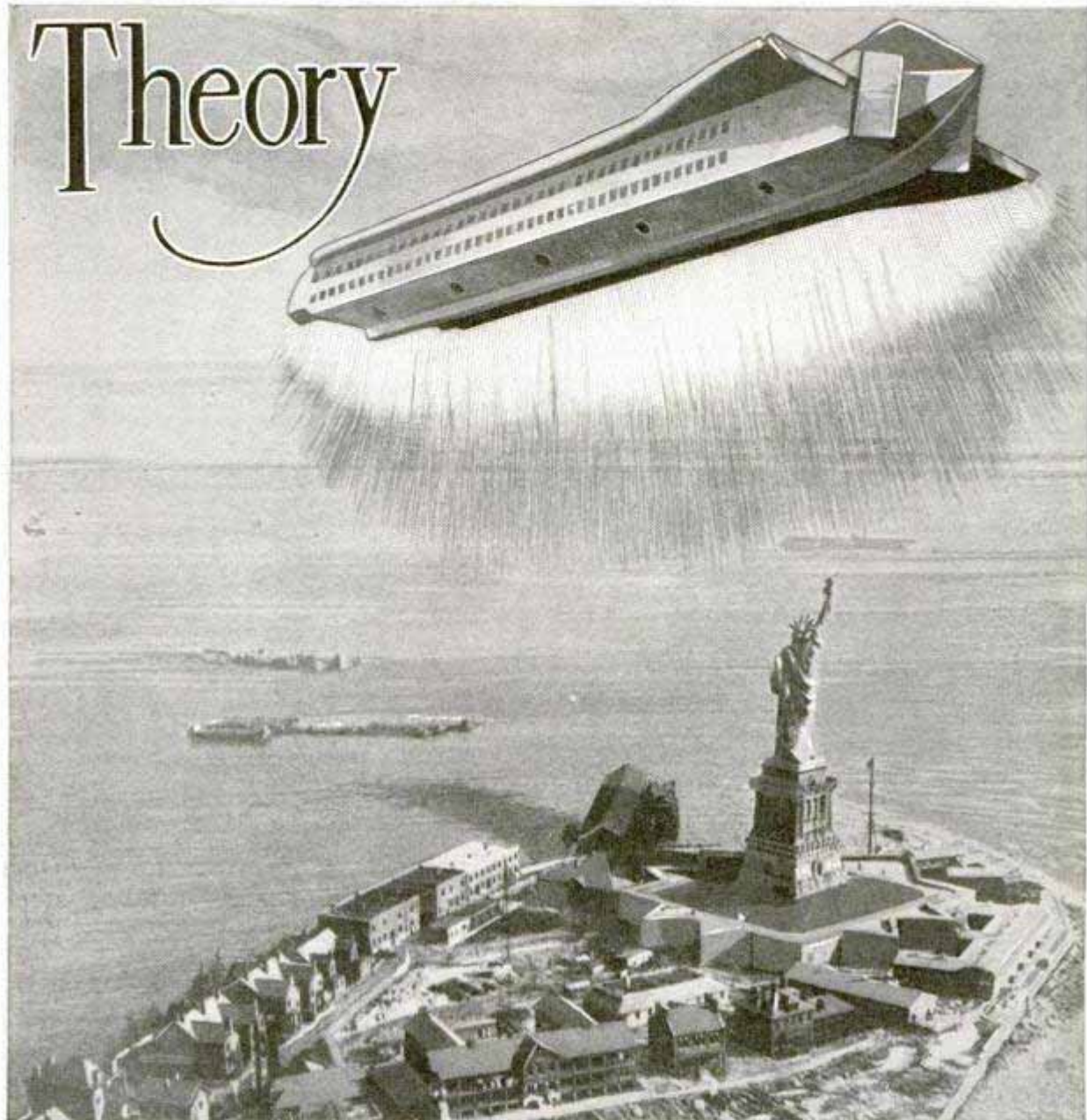
The new geometry, while it seeks to reduce all physics to one law, leaves one problem to be solved, and its success probably depends on further development to bring the theory of atoms within its scope. Doctor Einstein took a step in that direction in 1927 in two papers in which he attempted to define the laws of motion of atomic particles in the gravita-

tional field. When the theory of relativity was announced it was stated not more than twelve men in all the world were sufficiently educated in higher mathematics to fully interpret it. Like its predecessor, the new theory—six brief pages representing ten years' work—is full of equations that only a few scientists will be able to interpret.

But, while the theory itself is almost incomprehensible to the layman, it opens a field for fascinating speculation. Since it is possible now to insulate against electricity, it follows that, if electromagnetism and gravitation are the same thing, it may be possible some day to insulate against gravity. If that ever comes to pass, motorless aircraft may ride the skies, people may step out of skyscraper windows without falling to the ground, and a trip to the moon becomes theoretically



# Theory



Is This the Airship of the Future? A Motorless Craft Flying through Space because Insulated against Gravity; Einstein's New Theory Opens This Field to Speculation

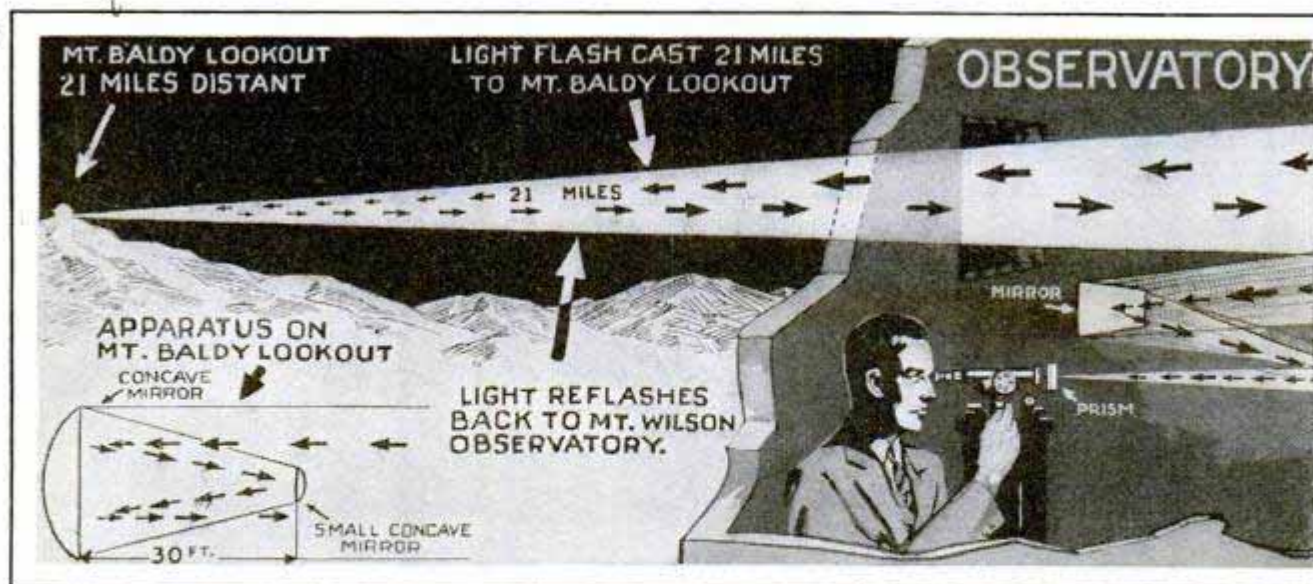
possible. Those are some of the avenues of speculation suggested by Dr. H. H. Sledon, head of the department of physics at New York University.

Since Newton first proposed the law of gravity—based, according to the story, which probably is not true, on the falling of an apple which struck him while he slept beneath the tree—science has been seeking some way of upsetting that natural law. The gravitational theory, as it was developed, assigned all movement in the universe to the attraction of masses. The planets were held in their courses by the attraction of the sun, and their orbits were made to deviate from a circular path

by the mutual attraction between them.

Then Einstein developed the theory, which is now elaborated, that instead of each body, through its mass, causing everywhere in space a certain effect known as gravitation, the latter effect manifests itself only in the immediate surroundings of the body in its gravitational field or area. That, according to Dr. Bruno Borchardt, of the Prussian Academy of Science, was the chief development of the theory of relativity. According to this theory, he says, "each body with its gravitational area acts on space in such manner as to shape or reshape it. In other words, space can no longer, as before, be





Einstein's Work Has Been Closely Connected, Since the Original Theory of Relativity, with the Measurement of the Speed of Light by Prof. A. A. Michelson, of Chicago University

considered as something absolute, such as time used to be regarded by us."

The confirmation of this theory left two general problems unsolved, according to Dr. L. L. Whyte, the British physicist. The first was its extension to include the phenomena of electromagnetism, and the second was the correlation of a continuous "space-time field" with the facts of the atom theory. Doctor Einstein's latest achievement probably is the best fusion of electromagnetism and gravitation that can be accomplished without considering atomicity, he adds. Eventually it may be necessary to invent still another system of mathematics to take the atoms into the fold and finally reduce all physics to a single law. Recent theoretical advances in atomic physics may make this possible within a short time.

Science has known for a long time that the repulsive force of magnetism when two magnets were placed parallel was theoretically great enough to overcome gravity, provided magnets of sufficient strength could be used. Recently engineers of the Bell Telephone laboratories and the Western Electric company—the manufacturing unit of the Bell system—found that a cobalt-steel alloy, invented some years ago by a Japanese metallurgist and now widely used in telephone parts, had magnetic strength to do just this.

When one of the bar magnets made from this alloy is placed above a similar bar, and constrained by guides to that position, the repulsive force is so great

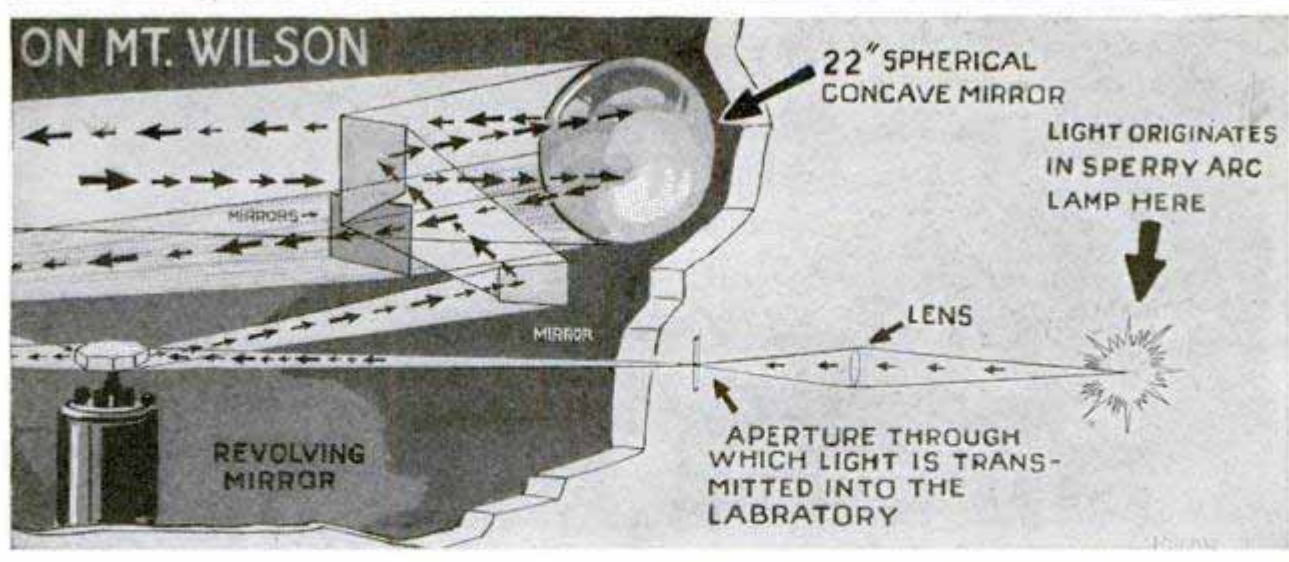
that one bar will be kept floating in the air, unsupported by any visible force. The repulsive force exerted between the two magnets is practically equal to the gravitational force on a single magnet, so that one overcomes gravity. As the repulsive force varies inversely as the square of the distance, it is possible to calculate the magnet strength needed to support a given weight at any given distance.

Announcement of this experiment was confused in the public mind with the use of permalloy, a new magnetic alloy made of nickel and iron, and used as a winding around the copper core of recent transatlantic telegraph cables. Neither of the magnets used in the floating-bar experiment is of permalloy, and, in fact, the two materials have exactly opposite characteristics. The cobalt-steel is used for the magnet bars because it will hold a very high magnetizing charge. The permalloy, on the other hand, gets its name from the fact that, after a specially invented heat treatment, it develops high initial permeability, that is, remarkable capability of being magnetized by very weak forces, while for strong magnetizing forces it is not as good as plain iron.

Weak magnetizing forces are commonly met in all forms of communication, wire, radio and submarine. The first use of the new permalloy, therefore, was as a winding for submarine-telegraph cable. Several such cables have been "loaded" by this method with permalloy tape, and, by virtue of the higher inductance they offer

Carboroy Co, Inc Schenectady N.Y.





The Michelson Experiments Were Checked Again This Winter with This Apparatus, Installed on Mt. Wilson and Mt. Baldy, Two California Peaks Twenty-One Miles Apart

to the weak telegraphic currents, thus offsetting the capacity from cable conductor to the sheath or sea water, they permit the transmission of a wider range of signal frequencies, and hence a higher speed of telegraph operation. Such cables have about five times the message capacity of the old-style cable. The permalloy also is being used to a wide extent for parts of new telephones and telephone apparatus, wherever its properties prove useful.

Because magnetism, as represented by the deflection of the compass needle, is manifest everywhere on the earth, the idea of harnessing the earth's magnetic currents is one that has been proposed for centuries. One of the oldest forms of perpetual-motion scheme proposed an incline up which a ball weight should be drawn by a magnet placed at the top. Just before the ball reached the magnet it was to fall through a trap, roll down a second incline, and return to the starting point, to repeat the performance. As far back as 1579, Bishop Wilkins described such a device in his book "Mathematical Magick," along with several others, all designed to utilize the earth's magnetic force.

Science discovered long ago that that force isn't strong enough to be utilized for anything much harder than turning a well-balanced compass needle, though, as recently as a year ago, two prominent flyers were reported to be interested in a so-called "magnetic motor" which was supposed to turn magnetic forces into power. Another suggestion offered to

the war department not long ago was that the nose of an aerial bomb should be magnetized so that the attraction of the mass of steel in an enemy warship would draw the bomb to the mark regardless of how it might be aimed when dropped.

As the most powerful electromagnets made have a lifting radius limited to inches, the idea of using magnetism, so far as it is now understood, is certainly impractical.

The Einstein theory, however, if it can be developed some day into a workable formula, may revolutionize all present-day accepted notions of what is possible. Radio, to begin with, was merely a scientific theory. The atomic theory itself was only an interesting speculation to begin with, but as a result of its classification of the ninety-two elements which it provides for, several of the unknown ones, such as illinium and niobium, have been discovered, and, in fact, only two of the ninety-two, both of them probably somewhat radioactive chemicals, remain to be found.

The atomic theory is closely linked with Einstein's theory of only one substance in all the universe, for it is based on the assumption that the only difference between the known elements lies in the number of electrons revolving around the proton which forms the center of each atom of the material. In other words, the atom is a little universe somewhat like our own, with a proton in the center in place of a sun, and electrons revolving around it in place of planets.



## STRENGTH TESTS ON BRIDGE TO AVOID ACCIDENTS



"Third Degree" Methods in Testing a Concrete Bridge; Using Stress-Measuring Instruments, and View of the Tanks on Span for a Weight Test

Accurate methods of testing bridges, to discover those that are unsafe, were demonstrated recently by engineers of the bureau of public roads who used special instruments in determining the strength and capacity of the Yadkin river bridge in North Carolina. The structure is a quarter of a mile long, has seventeen spans, three of which are 146 feet in length, and had been abandoned because of the building of a dam in the river. Under the arch of one of the longest spans, a scaffolding was

erected for instruments, to record strains and stresses from two tanks filled with water and placed so that their weight could be varied and their location changed.

First, the engineers cut through the floor to destroy the continuity of the concrete slab for a test of its strength. Next, various instruments were placed so as to record the amount of strain and to give data as to just how much the concrete span varied under the weight of the tanks. A clinometer was used to measure the change in the position of the arch rib. This instrument is similar to a carpenter's level. Changes in the length of the rib were measured with an instrument electrically connected to a central station



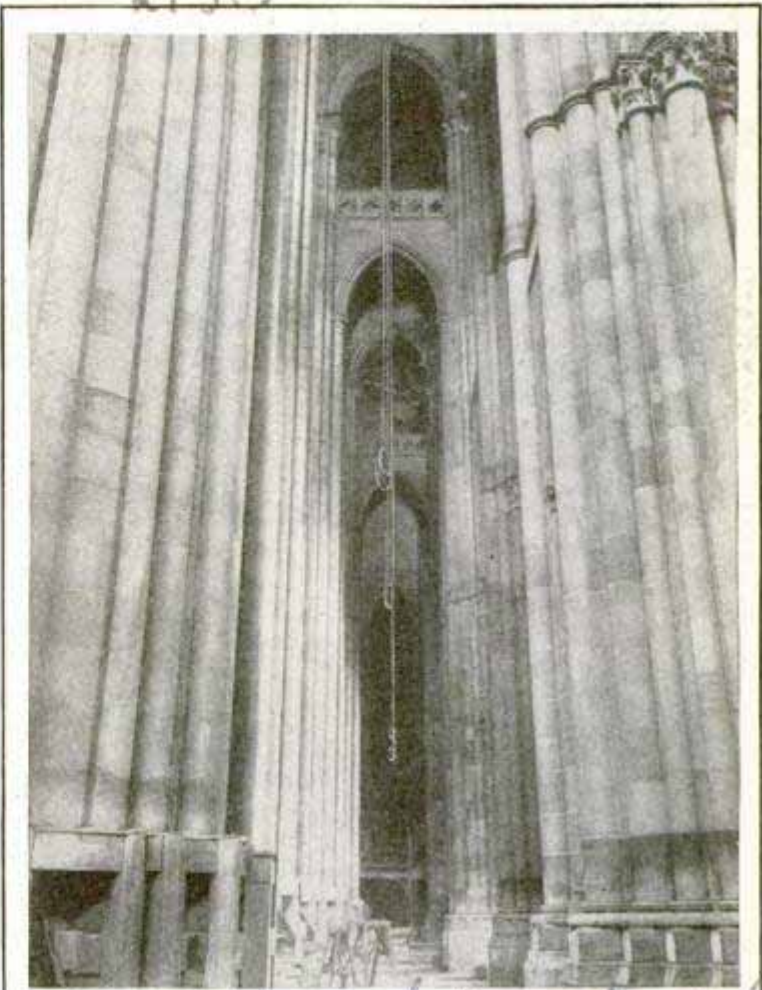
where the readings were made. By means of storage batteries, the instruments gave automatic records. Electrical methods were also used to gauge the change in the position of the arch rib. The bridge did not collapse under the heaviest load, but cracks developed which showed that it was unsafe.

### PARACHUTE HAS METAL RIBS TO AID IN LANDING *2220*

Several interesting features are combined in a marine parachute which has been devised and tested by a Chicago man. It is attached to the side of the plane, is released by pulling a cord and is connected by a strong rigging to a sling harness which the aviator wears instead of the usual parachute bundle. At the instant of release, the parachute opens quickly somewhat like an umbrella. It has twelve ribs of a strong, light metal and is so adjusted that it will not capsize and will remain afloat and open even if the jumper should alight on water, thus serving as a raft. The rig can be quickly closed up again for another jump, weighs less than twenty-five pounds and is so arranged that it is released from a plane flying at any angle.



Parachute as It Is Carried on Side of Fuselage; It Is Fastened to Pilot by Line and Opens When Released



View of the Nave of the Cathedral of St. John the Divine, Now under Construction in New York City

### HUGE CATHEDRAL IN NEW YORK TO BE THIRD LARGEST

On the basis of ground surface covered, the cathedral of St. John the Divine, now under construction in New York city, will be the third largest place of worship in the world. It will occupy more than 109,000 square feet. In exterior length, it will be second among the world's great churches. One of its most remarkable features is to be the nave which is ninety-six feet wide. The prevailing style of architecture is what is known as thirteenth-century French and was developed by medieval builders who erected the Notre Dame cathedral, and those of Amiens and Rheims. Sculptors and carvers are closely following the designs of the sculptors of old in the details of the decorations.

¶ Whales to the approximate number of 10,000 constitute the annual catch in antarctic waters.

*H.A. Berg, 1449 S. Michigan Chicago*



English  
542  
2241

Carnal Love

POPULAR MECHANICS

R. Route, Langley Wash



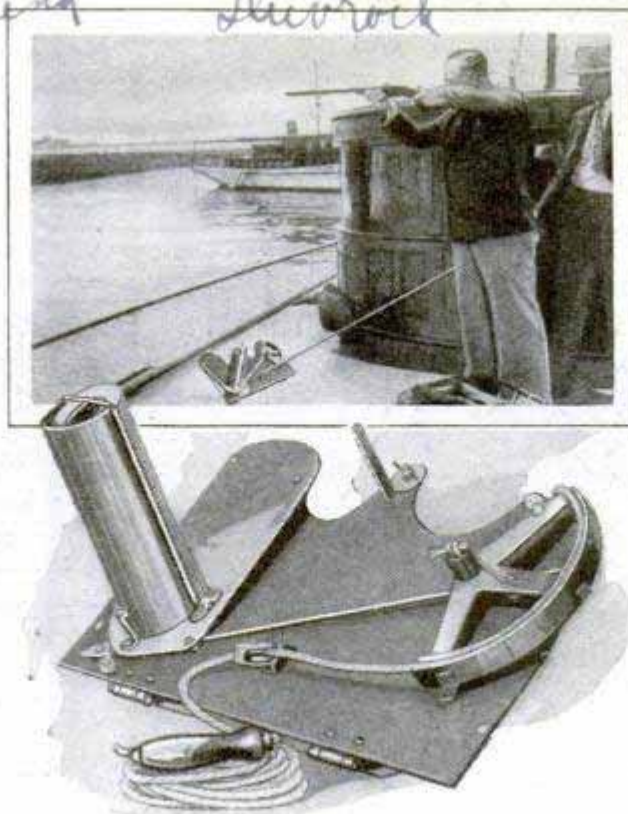
Carbon Inserter Adjusted to the Typewriter; It Saves Handling the Sheets Separately

### CARBON ADJUSTER FOR TYPIST SAVES OFFICE TIME

Sheets of carbon are adjusted between papers in typing by a machine which is said to save considerable time and trouble. It is so placed that it does not interfere with the operation of the machine.

### PORTABLE TRAP FOR SHOOTING AIDS OUTDOOR SPORT

Pleasures of trapshooting may now be enjoyed almost anywhere with the aid of a portable trap that folds up for easy carrying in motor car, boat or pack saddle. It holds forty-three birds which are fed automatically from the magazine against a spring that hurls them eighty-five to 100 feet at a pull on the release cord. Direction, speed of flight and angle are controlled at will, and the trap is quickly made ready for use simply by unfolding it and anchoring it with a special pin. The trap weighs less than ten pounds and is built to give long service.



Trap Gun in Use on Board Boat, and Close View, Showing the Magazine and Cord Trip

### MINERS HARNESS SURF TO GET GOLD FROM SEA FLOOR

In 1897, when gold was discovered in the sands off Nome, Alaska, there began a long series of interesting attempts at submarine placer mining, for quantities of gold were known to be farther out from the shore. Today, the beach is strewn with the wreckage of the various machines that were used, broken dredge hulls, steam and gasoline engines, and curious scoops that were meant to harvest the golden grains from the tides. The place would be a junkman's paradise, were it not for the facts that the freight rate to market is \$30 a ton and that a team of horses rents for \$40 a day. However, with pans and surf washers, considerable gold is still being taken from the sands. The surf washer is essentially a short sluice box, so arranged that the surf will wash the sands up into it and the particles of gold are collected by mercury. Sixty miles south of Nome, three miners are operating a development where they have found a pay streak below the line of the surf's wash. In the winter, they dig down through the ice and into the bedrock, thawing the way with steam. Before

spring, they dig out all the pay dirt they can and dump it above the line of wash, for later treatment with pans and a surf washer to collect the gold. They have operated this mine from under the ice for thirty years. The plant lies at the foot of the Council mountains, a range where many broken bodies of quartz have been found. When exposed to the frost, these quartz fields become free-milling ore, and for this reason it is possible for the waves to help extract the gold.

Target. \$6.00 per 1.000  
\$17.50

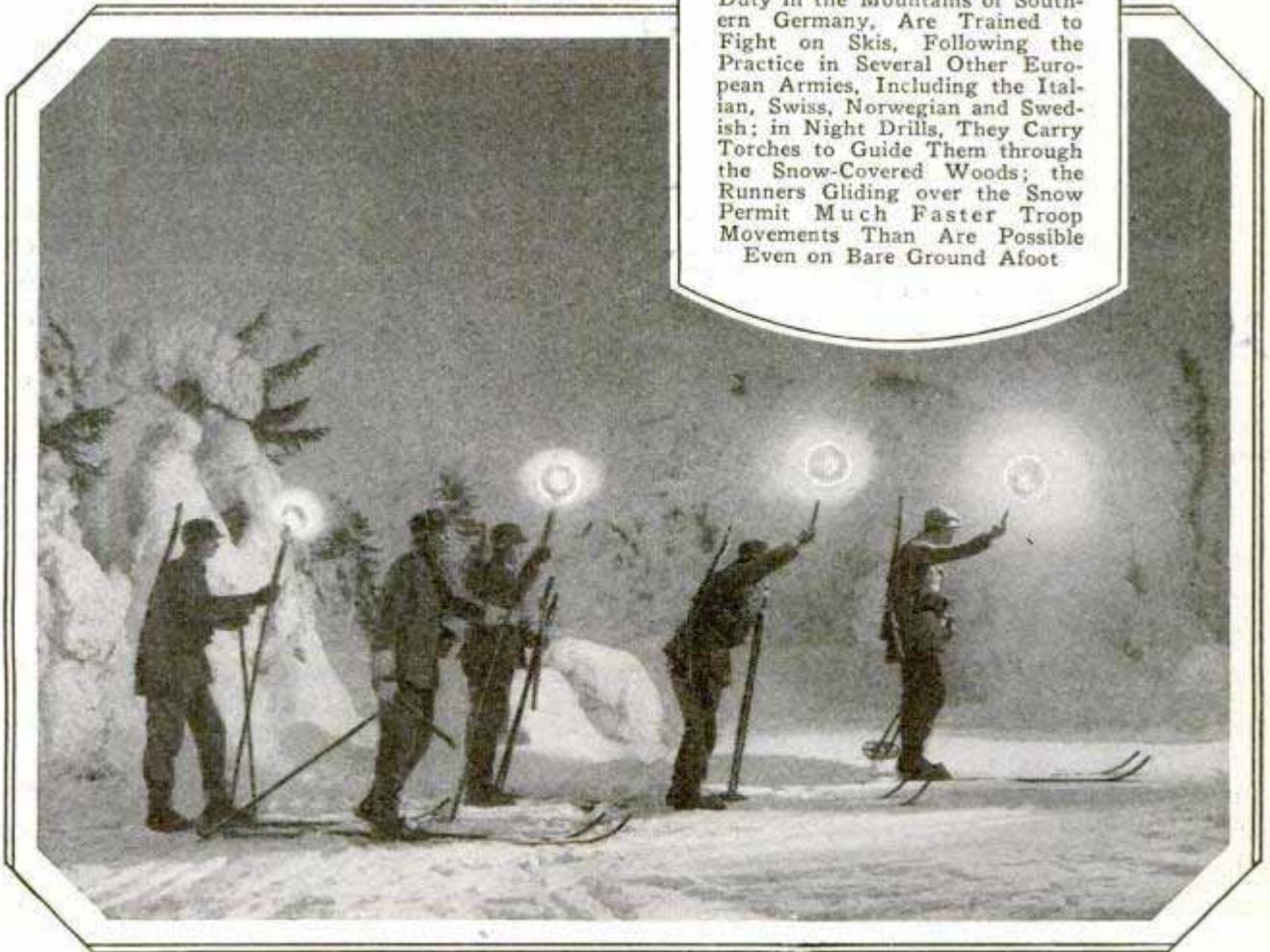
J. J. Lichman Co. 245 S. Main St. San Francisco, Calif.



# TRAINING NEW GERMAN ARMY TO FIGHT ON SKIS



Soldiers in the Reichswehr's Seventh Regiment, Picked for Patrol Duty in the Mountains of Southern Germany, Are Trained to Fight on Skis, Following the Practice in Several Other European Armies, Including the Italian, Swiss, Norwegian and Swedish; in Night Drills, They Carry Torches to Guide Them through the Snow-Covered Woods; the Runners Gliding over the Snow Permit Much Faster Troop Movements Than Are Possible Even on Bare Ground Afoot.







Utilizing the Tides to Build a Bridge; Floating Big Span into Position for Structure across San Francisco Bay

### "MOON POWER" IS HARNESSSED IN BUILDING BRIDGE

Engineers indirectly utilized the force of attraction from the moon in installing a 303-foot span of the highway bridge over the deep-water channel of San Francisco bay. Taking advantage of the high tide, the span, weighing 613 tons, was towed into place and slowly carried into the proper position as the tides receded. The bridge is more than seven miles long.

### JOINT RAIL AND BUS SERVICE TO SIMPLIFY TRAVEL

Joint rail and bus service is planned by the Pennsylvania railroad on the same principle as its combination facilities by trains and airplanes. Passengers will be offered the option of making their journeys partly by rail and partly by bus, using sleeping cars at night and busses for all or part of the journey by day. The service is expected to be extended until, in certain areas, busses may take the place of branch line trains or others where traffic is light and until through tickets, covering joint rail and bus journeys, will be sold over certain routes. The innovation will promote the efficiency of bus lines as feeders to the rail system, officials predict.

☐ Raising rabbits is becoming an important industry in the southwest.

### NEEDLE TESTS OIL PAINTINGS FOR FRAUDS

By means of a small hypodermic syringe, an eastern chemist takes samples of paint from old oil paintings for analysis. His research reveals the chemical nature of the samples and thus gives a clue as to the approximate age of the painting and its author, for different artists made the same colors in different ways, and the paints of various ages were of different chemical combinations. The needle of the

syringe removes a tiny cylinder of paint without mutilating the subject and enables the examiner to determine the quality of the different layers of paint, an important point when a new subject has been superimposed upon a painting.

### ELECTRIC ARC SOLDERING IRON USES LITTLE CURRENT

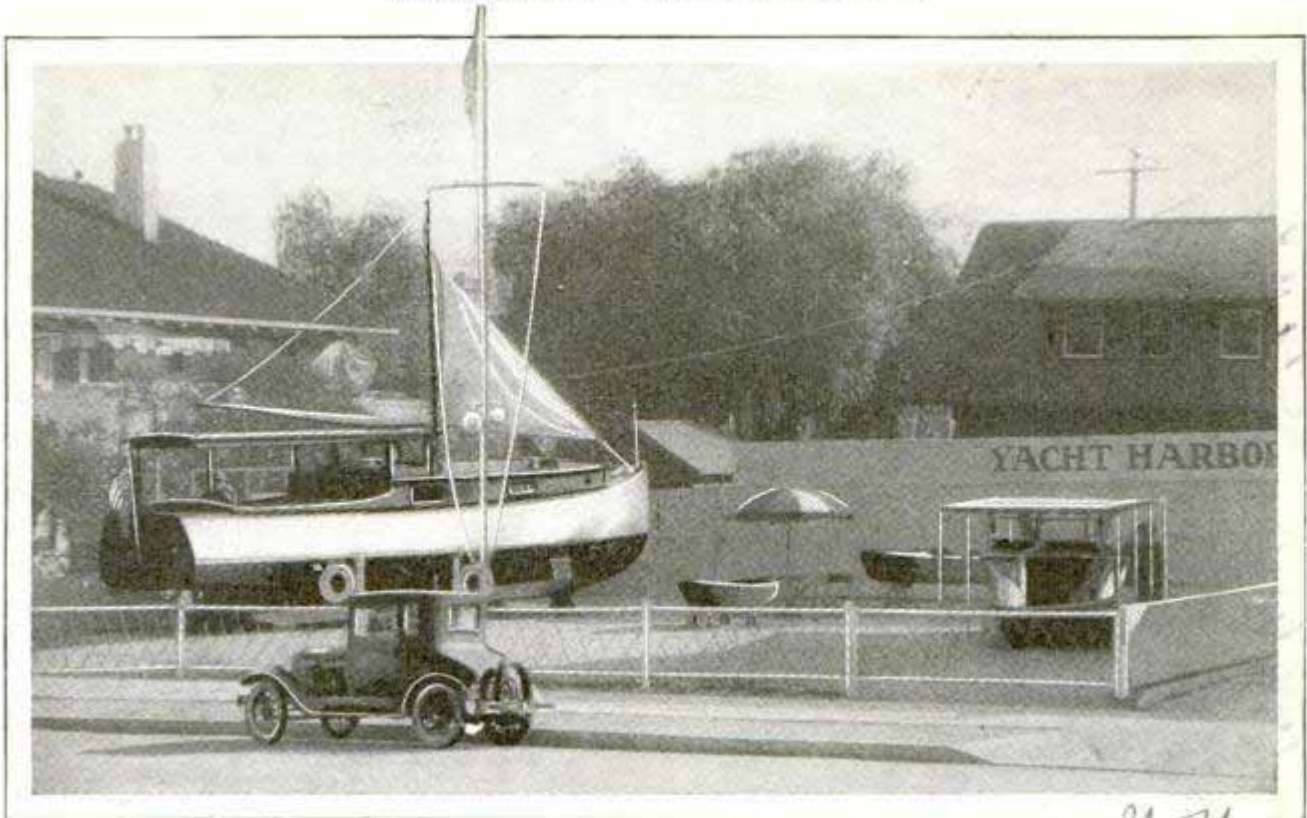
Economy of current and elimination of the usual wire heating element, are features of an electric-arc soldering iron which has interchangeable tips for many purposes. Only intermittent use of the current is necessary, as heat is rapidly gen-



Typical Uses of the Electric Soldering Iron, and a Close View to Show the Heat Control

erated through carbons that form an arc at the end of the tool. A thumb control in the handle permits easy regulation.





Yacht Harbor in City's Residential District Also Serves as Display and Sales Station; Craft in Storage at Los Angeles Yard Where Prospective Customers Can Inspect Boats

### INLAND HARBOR FOR YACHTS SERVES AS SALESROOM

In the midst of the residential section of Los Angeles, is an inland harbor for small yachts and other pleasure craft. Besides providing safe and convenient storage for the boats, the place also serves as a display and salesroom.

### EAGLE'S FEET ON COIN RIGHT? WRONG, SCIENTIST SAYS

When an eagle flies, does it tuck its feet under its breast or does it let them trail behind? The question has been asked before, but has come to the front again in considering the eagle design on our silver quarter dollars and twenty-dollar gold pieces. The bird is shown with its feet trailing. According to

Capt. C. W. R. Knight, British naturalist, who has taken motion pictures of eagles in flight, this is wrong. He declares that the bird allows its feet to trail only when it is taking off for a flight.

### DOUBLE EARPIECE FOR PHONE ALLOWS TWO TO LISTEN

Two persons may listen at the telephone at the same time or one may use both ears with the aid of an earpiece attachment which

slips over the receiver. It leaves one hand free, can be adjusted or taken off in a few seconds and is said to be a benefit to the hearing. The unit can be carried in the pocket. Of course only one of the listeners can use transmitter, but this is usually no drawback.



\$5.00 complete  
The Attachment in Actual Use and a Close View

Christian Science  
Monitor, 1/15/20

2136  
2202  
Capt  
American Earphone Co. Inc. 10 E. 43rd St. New York



# Fighters of

Cont. Leland S. Jamieson  
Belly Billy  
Don Arhant  
1940

Look

By LELAND S. JAMIESON

TWO STUDENT pilots of the army air corps advanced flying school walked from the office of the "pursuit stage" toward two airplanes on the flying line. On the way, they compared their watches.

"I'll meet you over Mitchell lake at 5,000 feet," one of them suggested. "Better make it ten-thirty—my motor's got a blown valve and I can't climb very fast."

"How're you going to whip me in a combat with a blown valve?" the other scoffed.

"Don't worry. I did it yesterday, and she was blowing then."

"Yeah, you got the drop on me yesterday by starting the fight out of a dive. You come in straight today, at cruising speed, or I'll pull out on you and there won't be any fight."

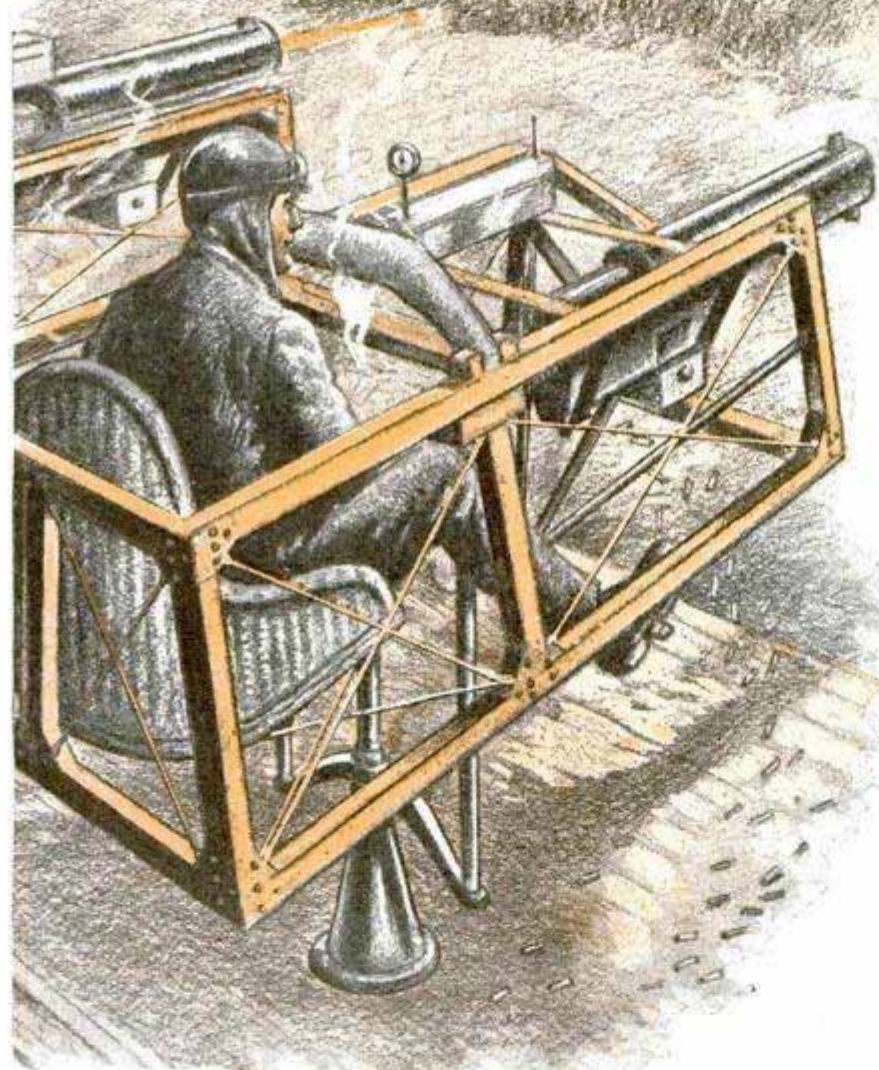
"Five thousand—at ten-thirty. Let's go."

Both men swung into their parachute harness and climbed into the cockpits of their planes. They spent a few moments inspecting the curious-looking black objects which nestled against the cowlings in front of the planes' windshields—their camera guns—then waved the blocks away and taxied out into the flying field. Streaking away in front of fan-shaped clouds of dust, they took off and climbed leisurely into the cloud-flecked blue.



# the Air

Student Gunners on the Machine-Gun Range at Brooks Field, Tex., Shooting at Moving-Airplane Targets



machine-gun control on his stick and squinted along the top of the fuselage at his opponent; the two planes passed each other, and instantly each man eased back on his stick and whipped his plane up and around. The "dog fight" was on.

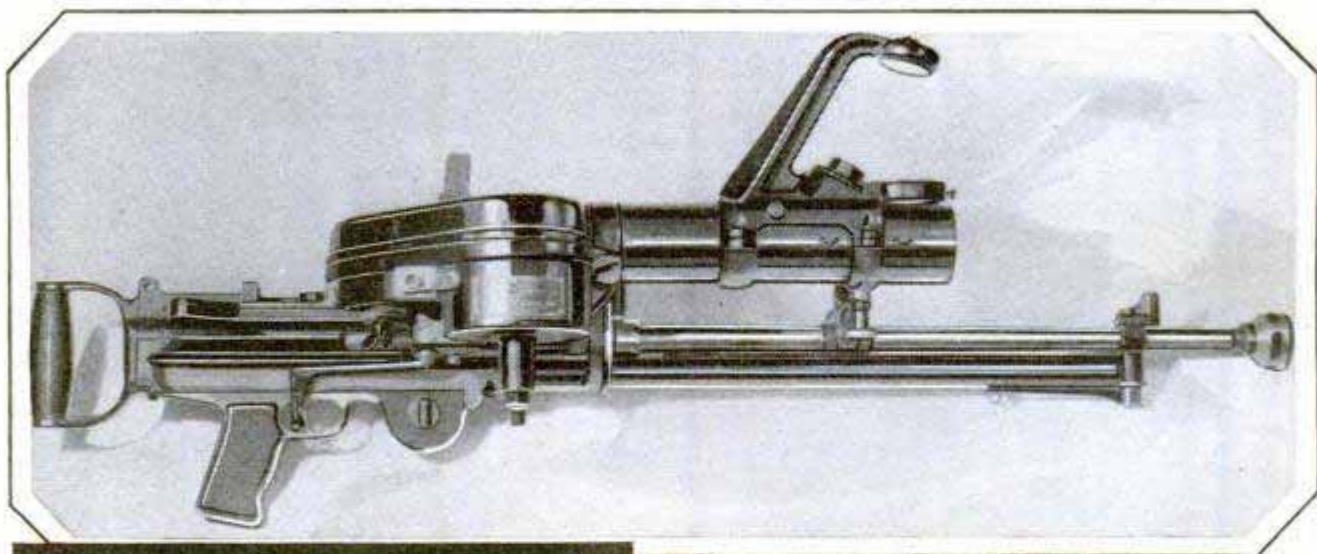
One ship was superior to the other in climbing ability, and gradually its pilot forced it around until it was upon the other's "tail." Slowly "feeling" his controls to get the maximum performance from his plane, he lined his sights upon his opponent—and pulled the trigger. The camera gun, actuated by a spring mechanism, began to "shoot," taking pictures at the rate of 100 a minute,

Ten minutes later, at 5,000 feet, they waved to each other, circled away and separated by a mile or more, then cut sharply and flew almost head-on. Gradually each man eased his throttle forward; each ship picked up speed until it was "spanking" its way through the air at 140 miles an hour. Each pilot gripped the

ute, photographing the area in front of the sights, where bullets, had they been fired, would have gone. The target plane slipped across the sights; it pulled up into the cross hairs; if machine guns rather than a camera had been used, it would have been shot down.

During the World War pilots were





Camera "Gun" Mounted on a Lewis Machine Gun, and Some of Its Pictures; the Plane, the Target Shows, Was "Led" to Allow for Deflection

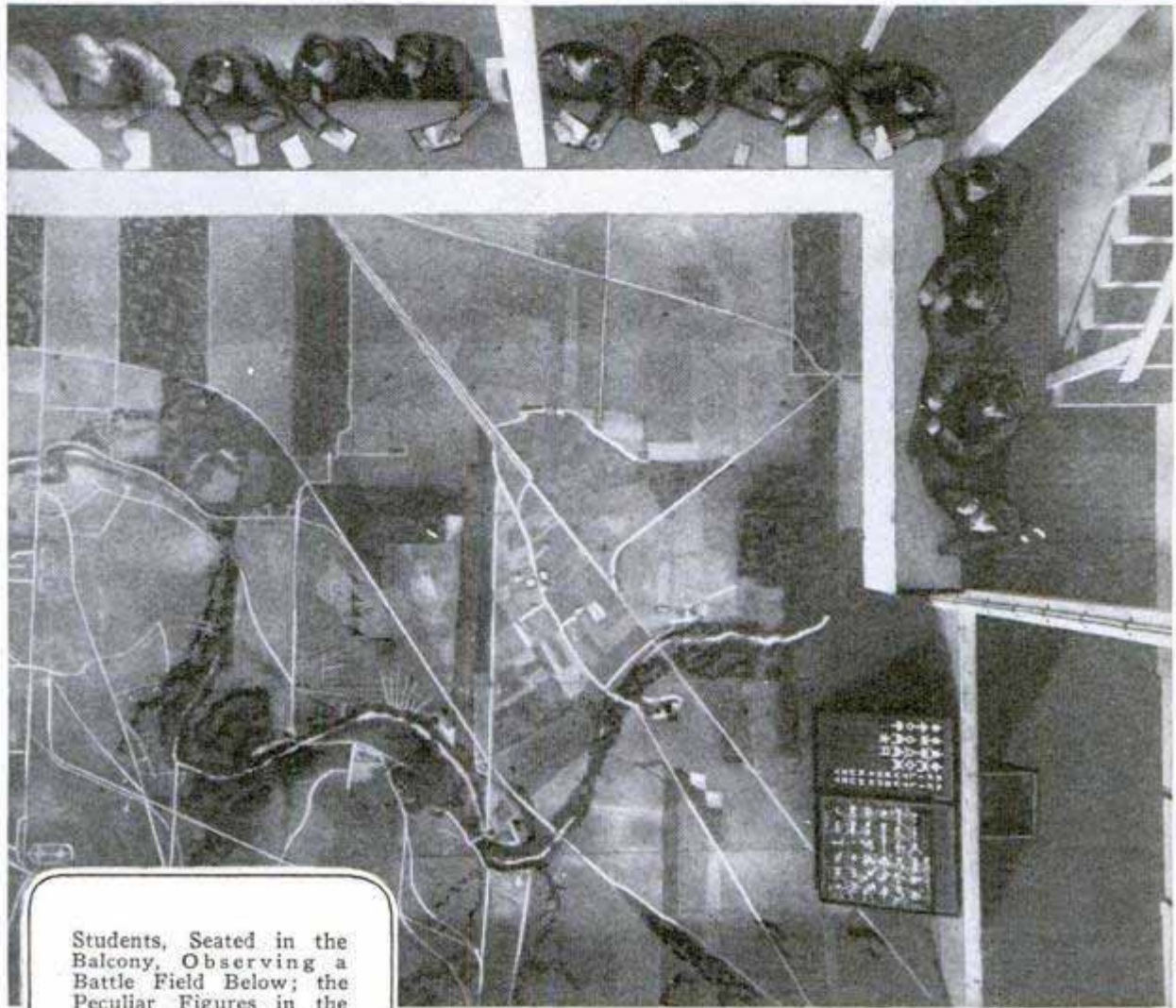
taught to shoot guns in the air by the use of small, captive balloons as targets. But the disadvantages of that system were manifold. An uninhabited area of considerable size was needed, to avoid the risk of wounding people on the ground; nor was it uncommon for the uninitiated embryo pilot to collide with his target balloon, which, in the days before parachutes were used, was practically always fatal. And having no movement of its own, the balloon presented a target much different from a darting enemy airplane.

As early as 1917, efforts were made to develop a camera that could take the place of an actual machine gun in training, and the combined efforts of the Eastman corporation and the air service produced what is now known as a camera gun. Mounted on an airplane, it furnishes a complete and accurate record of each pilot's marksmanship. By means of an ingenious mirror in the latest types of camera guns, the exact second of the exposure or shot is superimposed upon the finished print, thus forestalling any argument between combating students as to which one fired the first "fatal" shot.

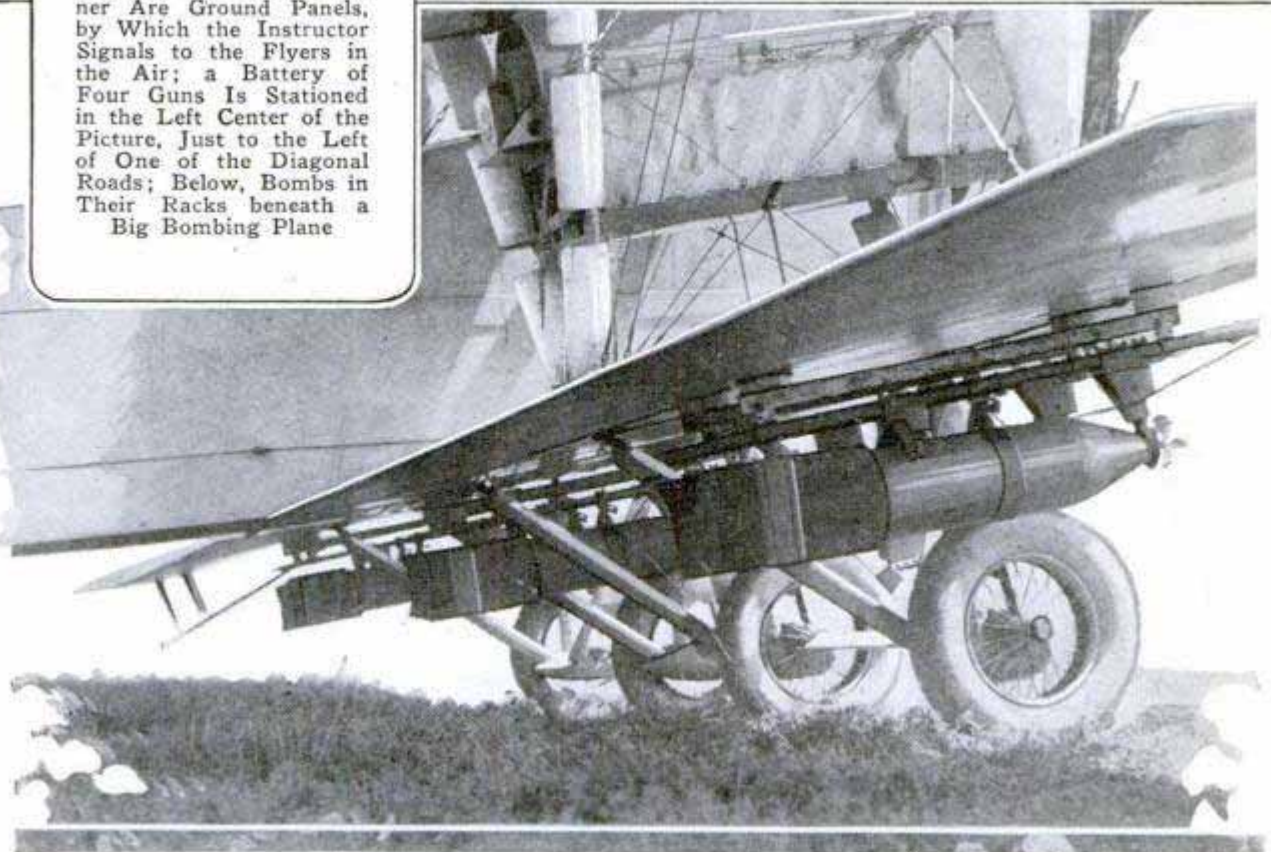
Later a method of giving student pilots machine-gun training on the ground was developed. In firing upon a moving object, a serious error in aim is encountered by the novice. At first, he aims his gun directly at the flying ship and fires, but by the time his bullet has been hurled from the muzzle of his gun to the target, the plane at which he is shooting has moved forward several feet, with the result that the bullet passes well to its rear.

A wooden frame, built very much like





Students, Seated in the Balcony, Observing a Battle Field Below; the Peculiar Figures in the Lower Right-Hand Corner Are Ground Panels, by Which the Instructor Signals to the Flyers in the Air; a Battery of Four Guns Is Stationed in the Left Center of the Picture, Just to the Left of One of the Diagonal Roads; Below, Bombs in Their Racks beneath a Big Bombing Plane







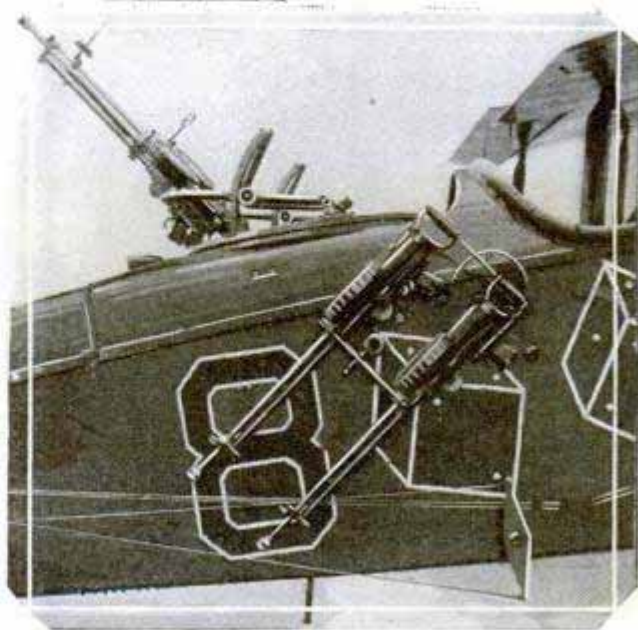
the skeleton of an airplane fuselage, and containing a full set of controls, was made, and on this a gun mount was placed. The gun, being fastened securely to the frame, was moved when the controls were moved, and thus the final development in machine-gun training on the ground was achieved. The student, to aim his gun at a given target, pushes on his rudder and control stick until his sights point at the object, then he presses his trigger on the control column and the gun fires.

But even this development was not exactly what was wanted, because until that time no targets other than the customary "bull and ring" type had been devised, and these, of course, offered no movement by which the student gunner could get training in deflection shooting. A new target was invented: A toy airplane that was attached by two eyelets to a movable wire, and this wire was pulled over a series of pulleys in such a manner that the plane traveled across the target butt in front of the gunner. Firing at a point-blank range of fifty feet, a target speed of seven and a half feet a second was the equivalent

of actually firing, at a range of 200 yards, at an enemy plane traveling at sixty miles an hour.

A more recent development in the art of synthetic-warfare training is the miniature range. Here, under the supervision of a specially trained instructor, students are given all the practical problems which they will encounter in dropping bombs from great altitudes, and in co-operating with artillery units in the adjustment of artillery fire.

A model landscape, built to scale from aerial mosaics of the terrain it represents, is used in giving artillery-adjustment training. Each student is equipped with a pair of earphones and a buzzer, and a radio key which connects directly to the earphones of the instructor. Seated in a high gallery overlooking the landscape, each man watches for the flashes of light that represent the impact of artillery shells, and when these flashes come, corrections are



Brooks Students Firing Camera Guns at a Real Plane; One of the Cameras, Center, and, Bottom, Machine-Gun Mounts on a Plane





Student at Brooks Plotting the Course of a Bomber over the Camera Obscura; the Training of a Fighting Flyer Includes Many Things besides Piloting an Airplane

made immediately and a report of error is made to the instructor.

The instructor calls to the assembled students: "Bracket adjustment"—one type of artillery fire. "Lieutenant Black, make the corrections after the battery is fired."

Immediately, working at a switchboard, the instructor's assistant snaps four switches down, then presses a button, and in four different spots upon the toy landscape a flash of light appears.

Over 300 tiny electric-light bulbs are placed at points under the canvas of the model terrain, and over 300 different combinations of "bursts" are possible, bringing into play practically every conceivable error in actual artillery firing.

To Capt. S. R. Stribling, of the ordnance department, belongs the credit for solving the problem of training for heavy bombing planes. He built a traveling carpet, representing the earth, stationed his bombers in a loft directly above the carpet, and above each is a bomb sight. The bombardier sits at his sight, determines the rate of air speed by the velocity of the carpet's movement, sights upon his target, and at the proper moment pulls his bomb release.

Instead of a bomb falling to the target,

however, the pulling of the release starts a stop watch, and the instructor, following the movement of the second hand, knows how long it will take the imaginary bomb to drop to the ground. Thus, if the bombing is being done, imaginarily, from 5,000 feet, the bomb will strike the ground seventeen and one-half seconds after it is released, and at that moment the instructor flashes a light at the point where the bomb would have struck.

Another ingenious device for giving bombing practice is the camera obscura. In practicing camera-obscura work, the pilot approaches the target in the same manner as when actually bombing, but at the moment at which the bomb would ordinarily be dropped, the bombardier flashes out a signal by radio to the instructor in the hut where the camera is located. In reality, this camera is nothing more than a rough lens, through which the image of the plane is cast upon a plotting table. At the signal from the bombardier, the instructor plots the path of the plane's shadow across the board, being able to grade the team in the plane, first by the time at which the bomb was supposedly dropped, and second by the straightness of the ship's path above the camera.



*Ans. J.C. Kleber and.*

552

*Herbert C. Mc Kay*

POPULAR MECHANICS

2155

*2101 Myra Court.*

*Brooklyn, N.Y.*



Filming and Recording a Home Talking Movie by Synchronizing Camera and Phonograph

## TALKING MOVIES MADE IN HOME WITH SIMPLE APPARATUS

The home motion-picture camera and a small recording phonograph can be synchronized for the preparation of "talkies," a group of eastern enthusiasts have discovered. A banjo number was one of the first produced and was a success due to the careful timing of the film to correspond to the rotation of the record.

## RADIO TALK WITH BYRD PLANE SETS WIRELESS RECORD

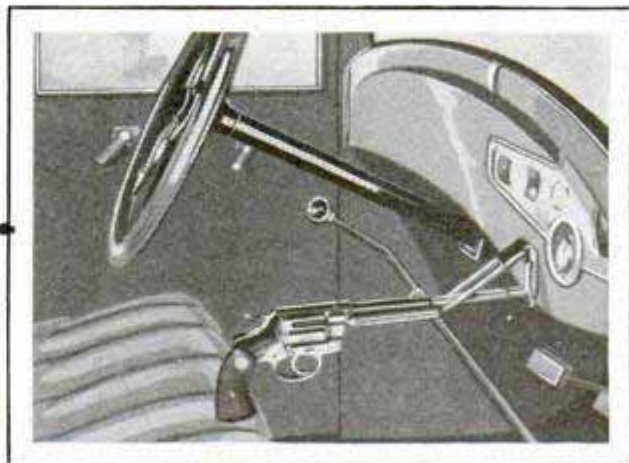
Flying 3,000 feet above the antarctic ice, Malcolm P. Hanson, radio chief of Commander Byrd's expedition, broke all previous long-distance wireless records from a moving airplane, when he talked with the New York Times radio station, 10,000 miles away. Reginold Iversen, radio engineer at the Times station, had been warned that a test would be staged from the Byrd plane "Stars and Stripes," by a call from Carl O. Peterson, operator on the steamer "City of New York," Byrd's base ship. "Listen in and try to hear the plane," was the call from Peterson at a few minutes after three o'clock in the morning. "The plane is now leaving the ice," was the next word. Iversen shifted the dial around to the thirty-four-

meter mark and picked up "WFC," the "Stars and Stripes" call. "Go ahead," he flashed back. An instant after his dot and dash "O. K." from the Times station had sped across the equator and far to the frozen south, back came Hanson's dispatch ending with the cheerful words, "sincere regards to yourself and the naval research laboratory and entire navy department on occasion of longest aircraft communication ever established. We are in flight 3,000 feet over Little America, Bay of Whales, Antarctica. Fine sunny night. Hanson."

The transmission ended twelve minutes after the report had been received that the plane was to go up.

## REVOLVER RACK ON AUTO DASH AIDS POLICE SQUADS

Attached to the automobile dash or other convenient place, a revolver holder has been found useful for police duty. It consists of a projecting bar held by a bracket. The revolver barrel is simply slipped over this bar so that the weapon is handy for immediate use. The holder



Sketch of Revolver Holder Installed on Dash Where Weapon Can Be Grasped Quickly

can be taken down in a few seconds, as the bracket slips out of a socket.

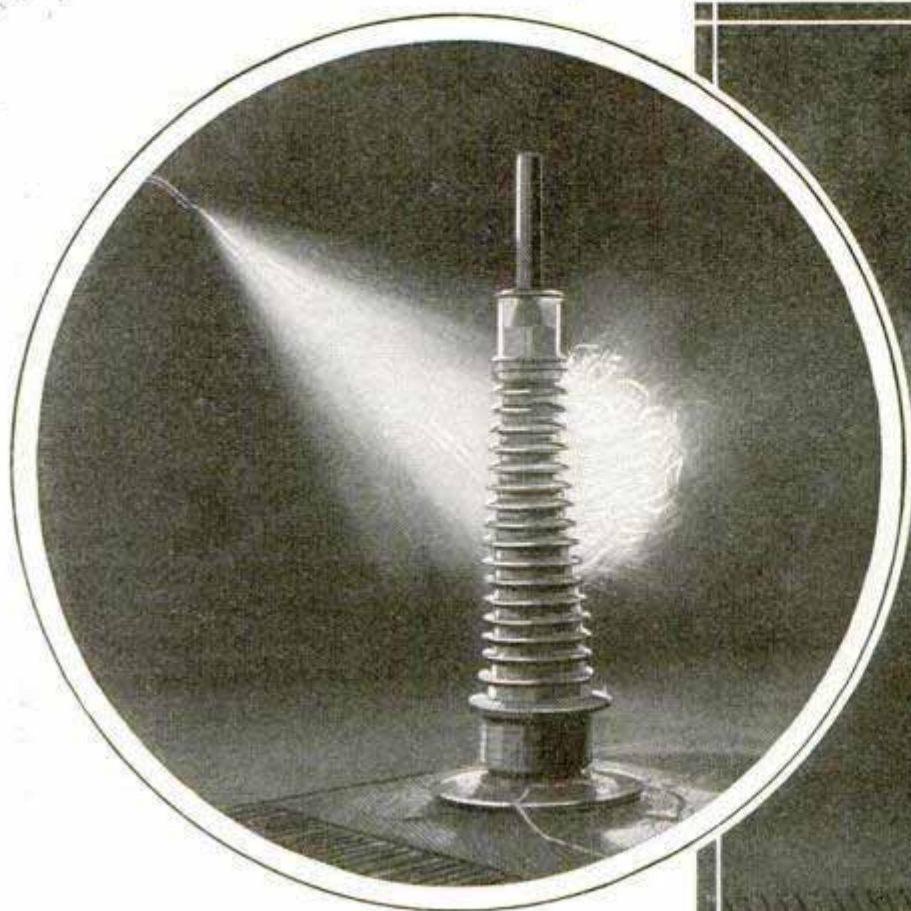
*Ans. Lieut. John V. Chung*

*not yet on market.*



2146

American Electric Corp. Camden, N.J.



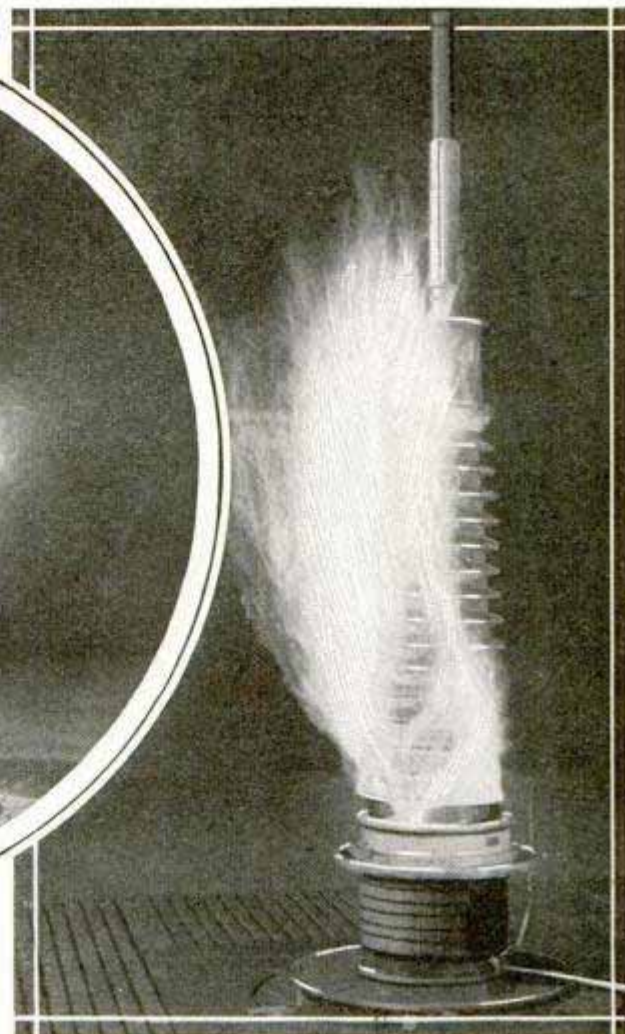
Testing an Insulator by Subjecting It to a Million-Volt Laboratory Flash

### MILLION-VOLT ELECTRIC FLASH TESTS INSULATORS

To determine the effect of lightning on bushings and insulators, experiments have been conducted in an eastern laboratory with an artificially produced flash of 1,000,000 volts. Wet-weather conditions were simulated by spraying a stream of water upon the unit under test while the electrical charge was on.

### HOLLOW WALL DEADENS SOUND MORE THAN SAWDUST 2203

Soundproofing involves careful study and practice, and scientists are just beginning to discover the proper way to protect interiors against noise. Among other interesting facts they have learned is that, under ordinary conditions, various materials that are supposed to deaden sound actually transmit it, so great care has to be exercised in constructing walls or other areas to make them soundproof. For example, hollow walls, in many instances, are better insulators against sound than those with an inner space filled with sawdust, or other



also per. Paul Sabene porous material. The filling, sometimes, instead of keeping the sound out, helps carry it through. Walls can be made soundproof without tearing them down, by covering them with soundproofing materials which may be used as a base for plaster or may need special strips for the lathing and plastering, depending upon the kind of material used. If the room is to be insulated against sounds from within, a special soundproof plaster, that deadens echoes, literally swallowing the sound before it can bounce back again to another wall, has been prepared. It is being used with success in broadcasting studios and other interiors.

### SHIP FEELS EARTHQUAKE 2225

Sailing over the center of an earthquake just when it occurred was the experience of a British freighter recently. She was off the coast of Chile, when three heavy bumps were felt as if she were scraping the bottom, though the charts showed the depth of water to be over 400 feet.

Chicago

Layserum Co. 300 W Adams

Chicago Daily News 1/30/29

Chicago Daily News

Magalda



# The Great Sahara



Count de Prorok and Amenokal Akamouk, King of a Vast Tuareg Territory in the Center of the Sahara

By JAMES N. MILLER

*1906 H St. N.W. Washington*  
**A**DVENTURES far more thrilling than those described in the current novels of burning sands and desert sheiks are described by Count Byron Kuhn de Prorok, explorer, just returned to America after two years of investigating archæological treasures in the heart of the Sahara desert. Within a few weeks he will be back in Africa once again, continuing his life work of revealing to science the secrets now concealed beneath century-old coverings of sand mountains.

A thousand miles into the remote recesses of the world's most mysterious wasteland, filled by desert desperadoes, the count made his way on his recent trip;

thirty-one years old, tells a graphic story of how he happened to go on his search for the mysterious white goddess—a search that finally met with success.

"I had long been convinced," he explains, "that the legendary queen must be far more than a fable. I had heard about her from virtually every tribe of desert folk and I knew that the belief in her one-time flesh and blood existence was adhered to by Prof. Emile Gautier, of Paris, greatest of all scholars of Sahara lore, as well as numerous other authorities.

"Back in September of 1926, therefore, I started my search by sailing from Paris, arriving at Algiers some ten days later. With me were twelve men of various scientific abilities, including Prof. Maurice

here meeting a people of giants close to seven feet tall but ruled over by hosts of masterful women; there almost perishing from sudden onslaughts of fierce and relentless sandstorms; while always he pressed steadily forward in the hope of solving the Sahara's most perplexing puzzle—whether or not the rumor was true that a powerful white queen, now buried amid untold riches, once ruled over a territory about as large as the United States and known as the home of the Tuaregs, descendants of the ancient Libyans, a cultured people who roamed the desert some 3,000 years ago.

Already renowned for unearthing many of the treasures of ancient Carthage, the youthful explorer, now only



# Treasure Hunt



Photos Courtesy of Count de Prorok

Countess de Prorok and Members of the Expedition Examining a Collection of Beautifully Worked Flint Instruments Gathered by Them near the Egypto-Italian Frontier

Reygasse, celebrated French archæologist, M. Louis Chapuis, well-known explorer, Henry Barth, photographer from the University of Paris, Harold Denny, of Paris, recorder of the expedition, Mohammed Belaid, famous Tuareg interpreter, and Bradley Tyrill, Pasadena, Calif., game hunter.

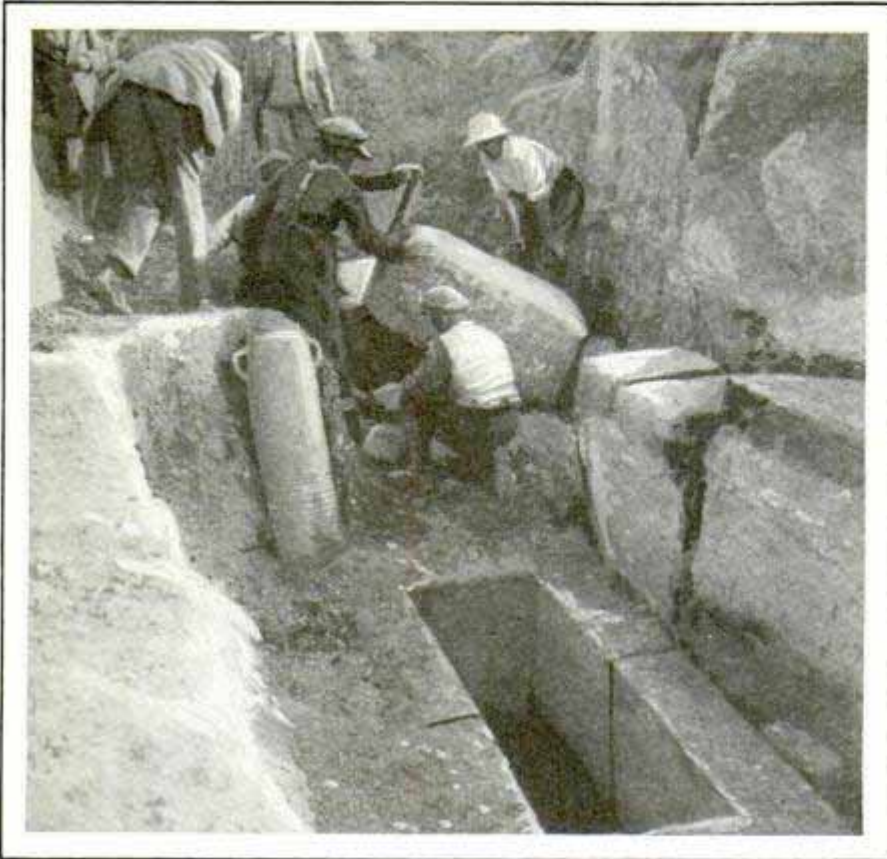
"Our preparations were unique. I had been studying the Sahara for a good many years and felt that camels, with all their vaunted endurance, were hardly the transportation mode for me, since they required great care. Nor was the standard automobile of much avail against the terrific onslaught of the wind and the great mountains of sand. So I finally hit upon the idea of having especially built for me three twelve-wheeled motor cars equipped with balloon tires. They worked admirably by boldly plunging through the torrid

sands and boulders and blasting many a new trail.

"We had to make careful arrangements with the French government so as to gain some assurance of safety from the desert brigands. The French responded generously. As most people know, their remarkable system of military guard consists in the maintenance, at strategic watering places, of garrisons, whose purpose it is to lend aid to law-abiding travelers as well as to protect the commercial interests of France. The men in charge are known as the 'Meharis' or military police.

"Only a few days of traveling through the picturesque Atlas mountains, and we were in the great Sahara. At this point we had no idea of the supposed location of the 'White Queen's' tomb, so we decided that it would be best to live among the natives for about a month, thereby gain-





Opening the Tombs of a Mediterranean Civilization Whose Riches Rivalled Those of the Entire Nile Region Today

ing their confidence and listening attentively to rumors of the supposed queen's whereabouts.

"Now, too, we were in the land of the Tuaregs, which word in our language means 'the abandoned of God.' In virtually every respect they are markedly different from the other desert nomads, being fair-complexioned underneath their tan, instead of black, practicing strange ceremonies and giving women an exalted place in the domestic life. In addition, the Tuaregs have resented interference from outsiders, so we had to plan painstakingly our early contacts with them. First of all we had sent ahead bales upon bales of sugar and tea, of which they are fond. Apparently our gifts had beguiled completely these desert stalwarts, for the king, Amenokal Akamouk, a jolly fellow of some fifty years of age, greeted us with open arms.

"Far from being overdrawn, the strange stories about the Tuaregs seem to me to be underestimated. The men wear veils while the women do not and the ladies possess most of the education. Not only do they control the home and family, but inheritance is likewise on their side. Even

when a child is born it automatically takes its mother's, rather than its father's, name.

"Nevertheless all this woman rule prevails in a land where the men are close to seven feet tall. Beautifully proportioned and of clean-cut features, the pure-bloods are just about a hundred per cent white, though of course the strong sun has given them a coat of tan. It is laughable to think of the men as painting their lips and eyebrows, but that's not even half the story. They actually wear their hair in what looks like a fantastic kind of permanent wave. The men do not prepare their own locks, however. That is the job of the women, and they fulfill it well.

"While, to our way of thinking, many of the Tuaregs' habits are exceedingly queer, yet they have certain delightful ones that are well worth mentioning. Take their music. It is like nothing else I have heard anywhere—a sort of plaintive wail with an occasional long note like the 'zing' of the Hawaiian ukulele. The 'amarad'—the instrument most commonly used—looks like a cross between a violin and a mandolin, and it is played only by the women. Up and down, for hours at a time, they wield the crossbow.

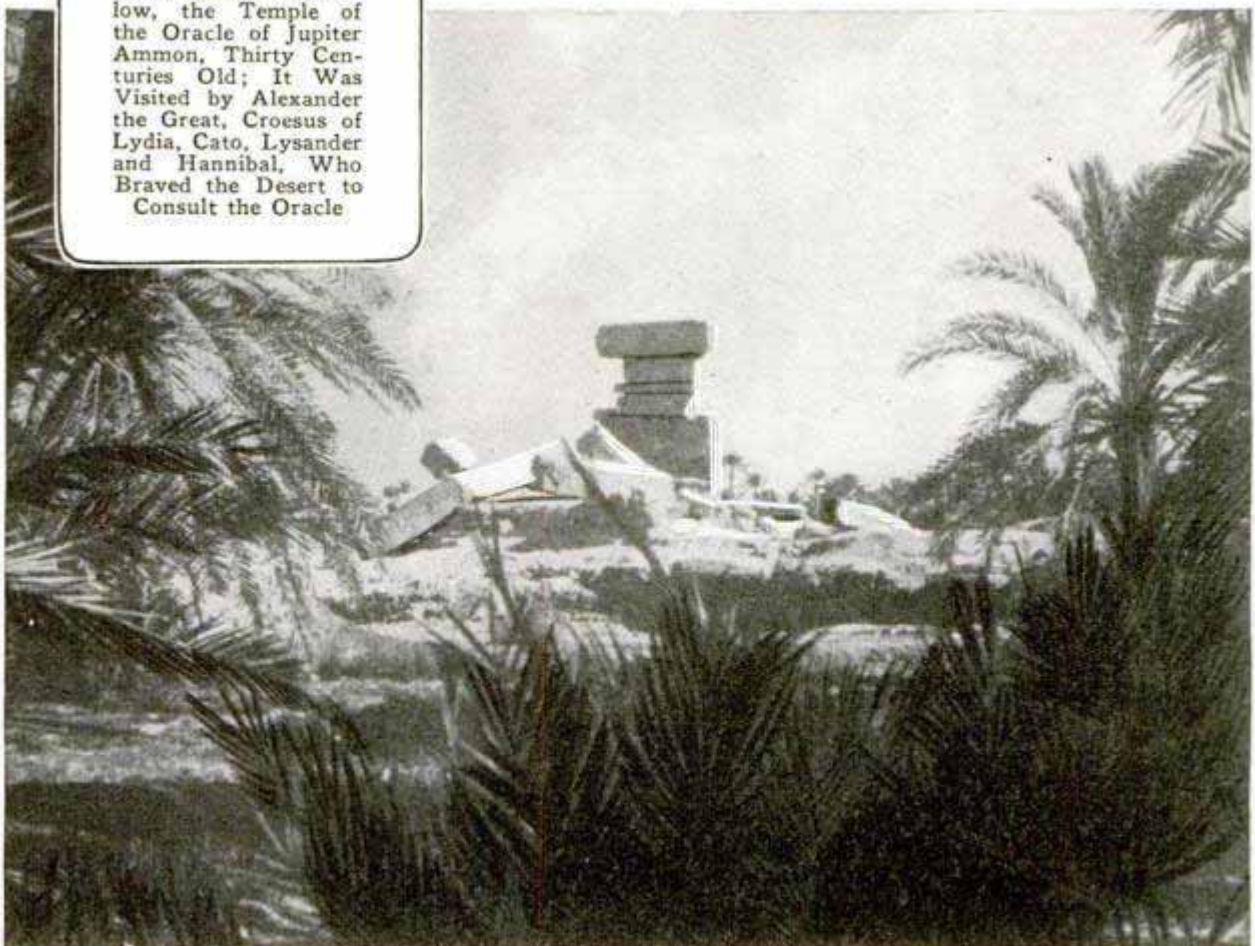
"Another charming custom is the invariable one of conversing entirely in verse. Imagine trying to frame your commonest thoughts in such fashion! Certainly the feat requires the quickest kind of wit, but the Tuaregs are quite equal to the occasion and some of their folklore is abundant with genuine classics of poetry commemorating mighty deeds of valor.

"After a month among these fantastic folk, we managed to glean, by means of careful questioning, what seemed to be valuable information about the possible whereabouts of a tomb purported to be that of the mythical White Queen. Guided





Count Byron Kuhn de Prorok and Maurice Reygasse, Administrator of the District of Tebessa, Being Escorted to the Tombs of the Kuids and, Below, the Temple of the Oracle of Jupiter Ammon, Thirty Centuries Old; It Was Visited by Alexander the Great, Croesus of Lydia, Cato, Lysander and Hannibal, Who Braved the Desert to Consult the Oracle







The Famous Fountain of the Sun, Which Ancient Historians Said Was Warm at Night and Cool by Day

by Belaid, our Tuareg interpreter, about three days after leaving the camp of the Tuareg king, we arrived at the supposed region of the White Queen's tomb. There was no immediate sign of habitation, so far as the white Tuaregs were concerned. Though only a few miles away, we found a number of mud houses inhabited by native blacks.

"A proper excavation procedure requires the services of a good many people and we were only five in the first truck. So there was but one thing to do and that was to hire some of the blacks. Having persuaded twenty of them to join our employ, we looked around us more carefully and noted what seemed to be a great circular monument, about 100 feet around, forty feet high and made up of great volcanic rocks, beautifully sculptured and wrought with ancient Libyan inscriptions.

"And now a few explanatory words about the accepted way to excavate a desert tomb. Of course, big spades are used, but every single shovelful of sand must be sifted painstakingly so as to make sure that no possible small treasure will be missed. Thus every member of our party had a hand sieve, and shoulder to shoulder we dug our way down, looking for all the world like a group of gold-seeking prospectors. As indeed we were, in a sense.

"Down at the base of the monument we

could early see the outlines of the tombs of twelve noblemen. Each tomb was about fifteen feet square and eight feet high, we discovered. Being pressed for time, we forced our way right through the heart of the monument, penetrating sand and stone alike. And most of the stones, mind you, were about two feet by three in size and were heavy enough to require two men to transport them from their original position. At a rough estimate, I would say that we removed in such fashion thousands of great stones

within our two weeks of excavating.

"For five days we kept right along, digging and sieving with remarkable zeal, considering the circumstances. Then, I made my first great discovery, a tiny red object about the size of a fingernail. It was a coral bead, almost identical with certain beads I had found some years before while probing the ruins of ancient Carthage.

"Shortly thereafter I found quite a few emeralds and garnets (cousins to the ruby) besides a great abundance of semi-precious stones. By this time we had worked our way down through stone and sand clear to the monument's floor. A few more deft movements of our spades, and our delighted and astonished eyes were offered the once-in-a-lifetime treat of a veritable Aladdin's carpet, covering the entire floor, red in color, made of leather and possessed of a beautifully wrought fringe about six inches long. It was preserved almost perfectly because the extreme dryness of the Sahara serves to keep most materials more or less intact for centuries.

"Among the objects found next, in the order named, were: a rock-crystal vase and a funny-looking nine-inch statuette of a broad-shouldered woman. This last was of the utmost importance because it heralded the greatest find of all. A few moments more of brushing the sand away,



and right beside this statuette was found a perfectly preserved skull of a woman close to seventy years old. The condition of the sharp-edged teeth told us that. It was the skull of the White Queen herself.

"With utmost care we continued to remove, with our brushes and bellows, the coating of sand in the surrounding region and soon found remnants of the entire corpse, including hundreds of delicately fashioned beads and all manner of precious jewels. The royal lady had been lying on a magnificent canopy of sculptured wood, portions of which were in well-nigh perfect condition. On her head had been a tiara, or jewel-containing garment, besides three feathers. This last discovery indicated strongly that the White Queen had been a veritable Amazon who had fought during warfare periods.

"After leaving In-



party was organized. But fortunately the lost members in their two trucks staggered into Oargla two days later.

"About the date of our find there was much controversy, some members of our party thinking it harked back to days before Christ, and others, that it dated far later. The argument was not settled until we reached Paris about a month later, and that was a curious situation. It seems that we had found a small wooden bowl, or vase, with silver designs on it. But since we had so many little curios to examine, we hadn't taken the trouble, while in Africa, to scrutinize this particular one very carefully. But one day in Paris I was entertaining a group of scientists and happened to be idly cleaning the vase, when underneath the sand and dirt I suddenly beheld three metal objects. They were Roman coins and their presence in the curio left no doubt but that our party had found the White Queen."



Excavating Tombs of the Amoriens, a Collection of Silver Coins of Alexander the Great, Found in the Desert, and de Prorok Meeting the Chief Guide of the Expedition

salah we were caught in a terrific sand-storm with certain dunes towering 1,400 feet high, and soon the three trucks became separated. My truck finally bore several of us safely to Oargla, a French fortress a few hundred miles away. We told the officials where we had last seen our companions and immediately a search

## GEESE WEED BERRY PATCH

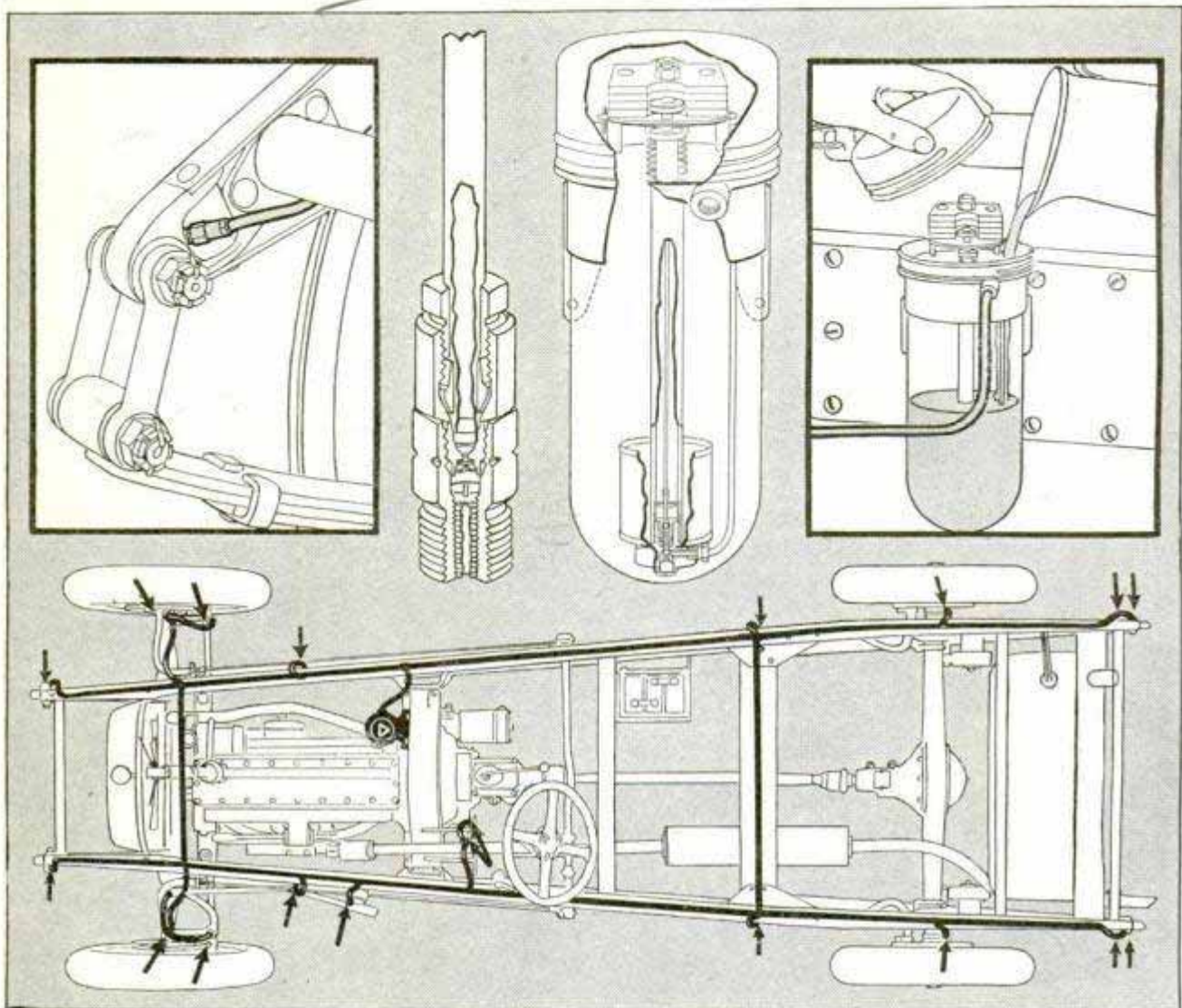
Geese have been used as a substitute for laborers in keeping a North Carolina strawberry patch free from grass, and the practice is said to be spreading throughout the south. The birds eat the grass but do not touch the berries or plants.

*Prof. George M. Harrou*

*W. S. Lupton, Oargla*



## AUTOMATIC OILER REACHES ALL PARTS OF THE CAR



Sketches of the Automatic Chassis-Lubricating System; Top Row from Left to Right, Bearing Connection, Cross Section of Resistance Unit, the Pump, Filling Reservoir and, Below, Scheme of Entire System

Continuous and automatic lubrication for the automobile chassis is afforded in a system that utilizes the effect of road shocks while the car is in motion to keep all bearings thoroughly oiled. All the motorist needs do is to fill the reservoir. There is nothing to push or pull, for the car literally lubricates itself. This is accomplished by the action of a pump inside the oil reservoir, a glass container installed under the hood, on the dash or in any other suitable place. The pump is so adjusted that it is operated by the jarring of the car. This motion causes oil to be forced into the line. To control the flow, resistance units are installed at each bearing. They govern the amount of oil that reaches the bearings and are also fitted with a fine screen to keep out foreign substances. A small check valve is incor-

porated in each resistance unit to prevent the system from draining, a trouble likely to occur, since some of the bearings are higher than others. By turning a screw in the pump, the amount of oil to be fed into the line can be regulated. This is the only adjustment necessary.

### PLANE SOLVES SEA MYSTERY 2109 IN FINDING SHIP

Lost for six days after a storm, and unable to communicate with ship or land, the Russian motor vessel "Communa," with twenty-six persons aboard, was found by airplane recently. The boat's engines had been disabled and it was helplessly drifting when it was seen by observers in the low-flying plane. A tug was sent to the rescue.

Capt. Wilkins



Int Bldgs 1/26/29 waterford, ind

Experiments made by Building Research Station

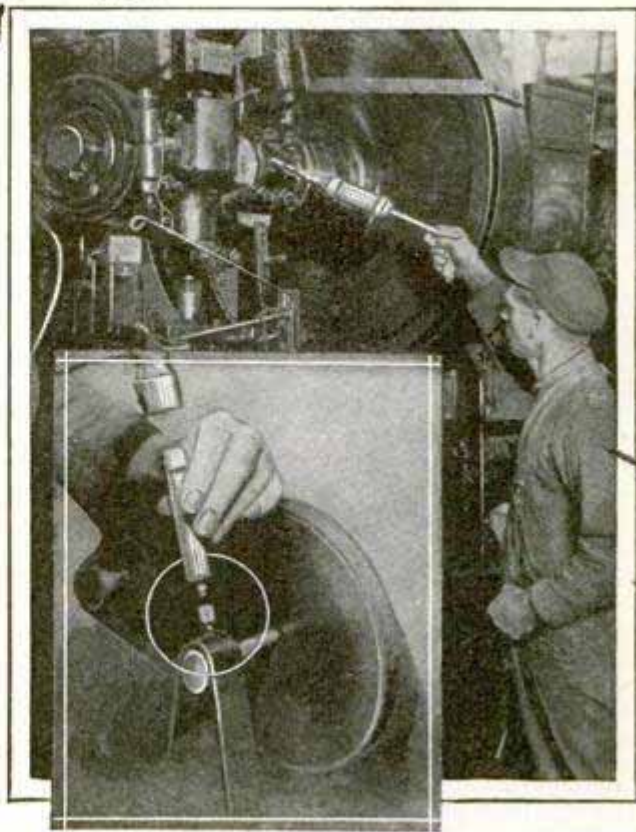
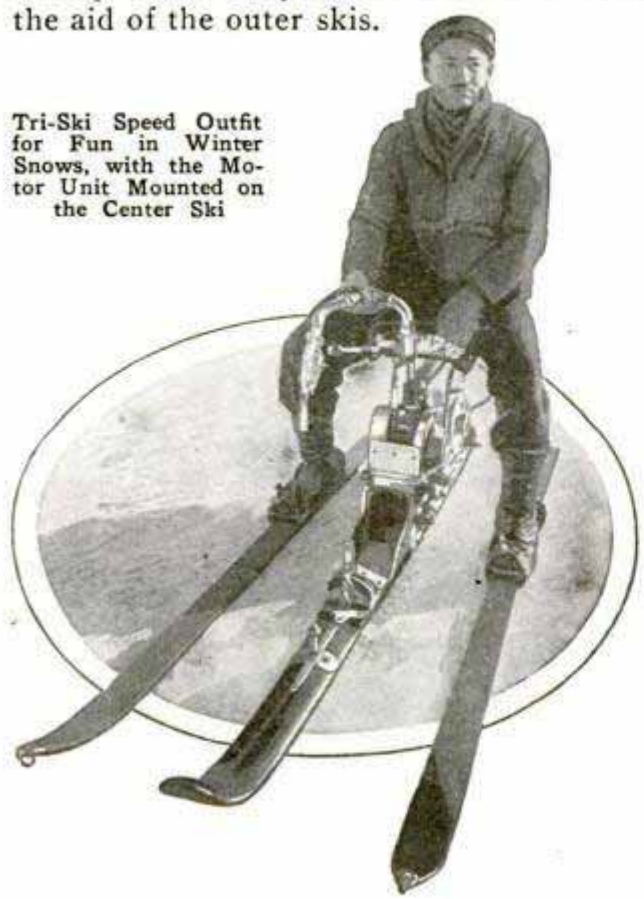
# KILL GERMS THAT EAT STONE TO PRESERVE BUILDINGS 24

Scientists are waging a chemical warfare against harmful germs that devour stone and other building materials. Some sixty different species of organisms that eat stone and other substances have been discovered, and chemicals that will kill them without damaging the material are being sought. The germs weaken structures by opening pores in the surface, thus exposing it more to the weather and causing it to crumble. It has been found that some of the bacteria will cause erosion in the hardest marble in three weeks. Investigators have found that beetles and some other insects that have been blamed for damage to buildings are not at fault.

# MOTOR SKIS AT SWISS RESORT GIVE WINTER THRILLS 21 73

St. Moritz, Switzerland, long has been famous for its winter sports, and this season a new one was provided in motor skis for fast travel over snow and ice. The rider, wearing skis, sits on a third one to which a motor has been attached. The controls are within convenient reach, and the operator easily balances himself with the aid of the outer skis.

Tri-Ski Speed Outfit for Fun in Winter Snows, with the Motor Unit Mounted on the Center Ski



Greasing Bearing through Special Fitting, and a Close View of Installation

# FITTING CLOSES OPEN OIL HOLE AND SAVES WASTE

High-pressure fittings have been introduced for open oil holes on machinery to keep out the dirt, save waste and afford the benefits of pressure lubrication to parts that ordinarily are oiled in a more or less haphazard manner. The units involve no threading operation and can be installed in a few minutes. First, a bushing is driven into the hole and into the top of this is inserted a nipple with a dirt-proof ball-check valve. An ordinary hammer and three special tools form the necessary equipment for installing the fittings. So equipped, the parts can be lubricated with a pressure gun.

# SEA GRASS STOPS SOUND AND KEEPS BUILDINGS WARM 2246

Builders have discovered that a common variety of sea grass is serviceable as an insulator against sound, heat and cold. Like other cellular substances, when dried, it proves an effective shield against noise and is said not to harbor insects while it is practically fireproof. It is being used extensively in some sections for upholstery and mattresses.

Zostera marina

Int Bldgs 1/26/29

Alumite Mfg Corp 2650 N. Crawford Chicago



1943

James H. Miller,  
1006 H St. N.W.

Washington, D.C.

# The World's



tions that are known as "nematodes"; while, in virtually every sizable aviation field of the army air corps, there are specialists called "dopesters," whose main job is to cover sections of recently repaired planes with a chemical compound so poisonous that some of the applicers actually have to drink as many as five quarts of milk a day in order to counteract the dope that seeps into their system and makes them "groggy."

**I**N UNCLE SAM'S big science mill at Washington, where practically everything under the sun is made, perfected, studied or examined so that we may be happier, healthier and live more comfortably, there are hundreds of experts who spend scores of years and sometimes entire lifetimes on research projects of the queerest kind imaginable.

One, for instance, with the tongue-twisting title of "helminthologist," spends hours examining under the microscope the almost countless varieties of strange parasites that prey particularly on humans; another often has to stick his head deep into funny-looking and especially devised contraptions so as to watch the frolicsome maneuvers of those fantastic, whip-like organisms of almost uncanny shapes, sizes and descrip-



Dr. W. W. Coblentz, of the Bureau of Standards, Testing Glass Screens to Protect Movie Stars from Kleig Lights, and Miss Eloise Cram, Bureau of Animal Husbandry, Examining Chicken Pests

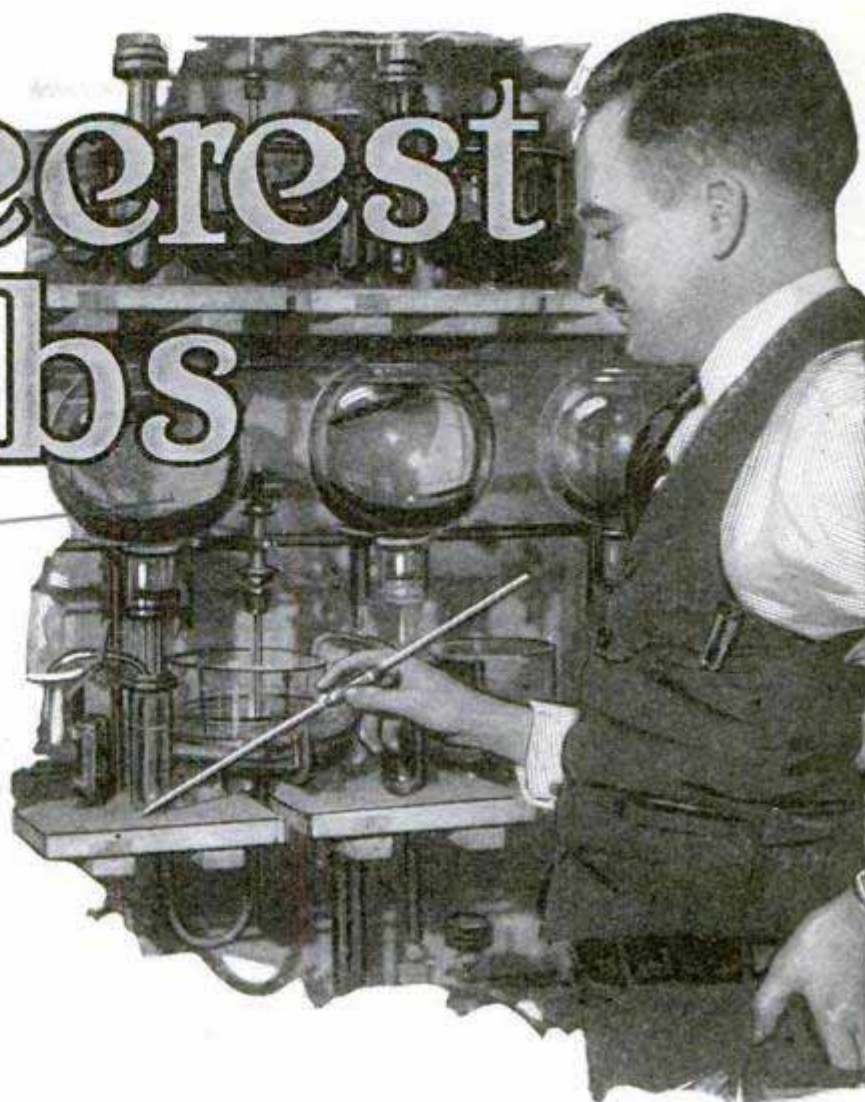


# Queerest Jobs

Not all these jobs, of course, are dangerous, and may be it's not quite fair to call them queer, since every one seems to be absolutely essential in advancing the almost breathtaking hop, skip and jumps of modern-day science. Yet, to the average person, they are bound to take on a singularly strange, or at any rate novel, character.

Take the case of William N. Dovenor. He is an artist and, in his official capacity as chief scientific illustrator to the bureau of entomology, his main task is to devise a rogues' gallery of insects harmful to man and orchard. Ask him what he has been doing for the past sixteen years and he'll reply "everything under the sun," while explaining that first of all his purpose is to sketch the complete life history of the knaves of "bug-ology" so that the farmer and gardener may learn how best to control them and so protect their crops.

To hold a job like that requires the utmost patience and painstaking study. May be for as long as ten days, or even two weeks, Mr. Dovenor, in the recesses of his studio, will be called upon to spend every available working hour studying the wriggings of a single insect larva that isn't much more than visible to the naked eye. But it is just such seemingly inconsequential creatures that devastate and destroy



A Government Chemist Practicing Ultra-Filtration in a Delicate Test, One of Many Made Daily

hundreds of thousands of acres of corn, tobacco or cotton.

On one single canvas, containing but twenty-six views of twelve different larvæ, his endeavors occupied several months.

Movie stars may not realize the fact, but it is nevertheless true, that much of their indebtedness for relief from the strained-eye ailment, known in its advanced stages as "Kleig eyes," is due to the efforts of Dr. W. W. Coblentz, of the bureau of standards. When the subject was first brought to his attention, he conducted many tests with various glasses to cap the high-powered Kleig lights. But not so long ago he made the astonishing discovery that probably the very best thing for the purpose was ordinary window glass. The reason is that it does not transmit the piercing ultraviolet rays, a situation that, strangely enough, has caused window glass to be condemned rather universally by the health experts.



The helminthologist is Dr. Maurice Hall, best known, probably, for having done more in devising ways to combat the persistent human tapeworm than any man in America. There have been times when Doctor Hall has swallowed the undigestible creatures, and now and again the results have placed him pretty close to the martyr list of research workers.

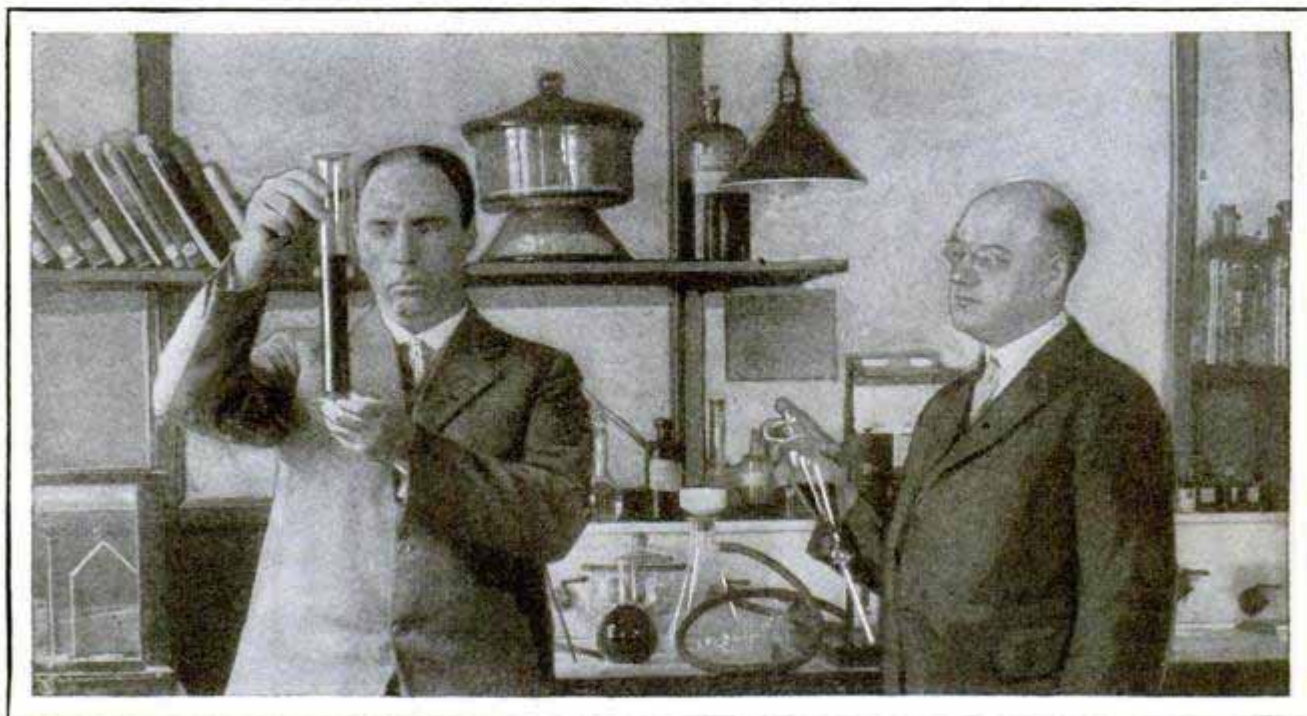
Similar to Doctor Hall's is the everyday work of Miss Eloise B. Cram, zoologist, whose study of internal parasites is confined to chickens and pigs rather than humans. Her efforts alone undoubtedly save American farmers hundreds of thousands of dollars each year. Her chief occupation just now is to find out how the serious poultry diseases are spread. She has long held the idea that, may be, the cockroach, the grasshopper, or else the cricket has had a hand in the situation, and lately she has proved that insects indeed are to some extent guilty of transmitting the diseases.

In the same general line of work as Doctor Hall and Miss Cram is Dr. N. A. Cobb, who bears the title of "nematologist." Thus graphically does he describe the vital importance of his studies: "If all the substance of the earth and of the things that flourish on it, with the exception of the threadlike organisms known as nemas or nematodes, could by a stroke of magic be made invisible, then it would

still be possible to distinguish the soil-covered parts of the earth, the streams, lakes and oceans, the insects, animals, birds, fishes, plants and humans. So widespread and abundant are the nemas, that in this imagined world of transparencies most living things, such as the blanket of soil on mountains, hills, and plains, and the bodies of water would be indicated by clouds of these living threads which vary in length from a small fraction of an inch to several feet, and in diameter from that of the finest of hairs to the thickness of a lead pencil."

An observer, looking through a high-power microscope, views in a lighted field a world as complex and as full of mystery as that we see daily with the unaided eye. There are poorly lighted recesses in this world that hold their secrets tenaciously and seem to require for their exploration something comparable to the spotlight in a darkened room.

Just such a spotlight has been recently discovered by Doctor Cobb. Knowing, of course, that when the image of the sun is reflected into the field of vision of the microscope, its brilliance is far too great for the unprotected eye, he investigated further. To his surprise he found that on hazy days he could actually form the image of the sun on the tissues inside the object being examined. This bright spot lights up the surrounding tissue, en-



Mixing Deadly Potions, to Be Tried Out on Cockroaches and Other Insect Pests, Is the Regular Job of J. W. Sale and J. B. Wilson, of the Food, Drug and Insecticide Bureau





Above Is One of Uncle Sam's Many Unusual Tasks, Holding a Duff Hygrometer on the Ground to Determine Whether the Moisture Content of the Grass Is So Low as to Cause Fire Danger; at Left, Dr. M. C. Hall, "Helminthologist" Who Studies Parasites

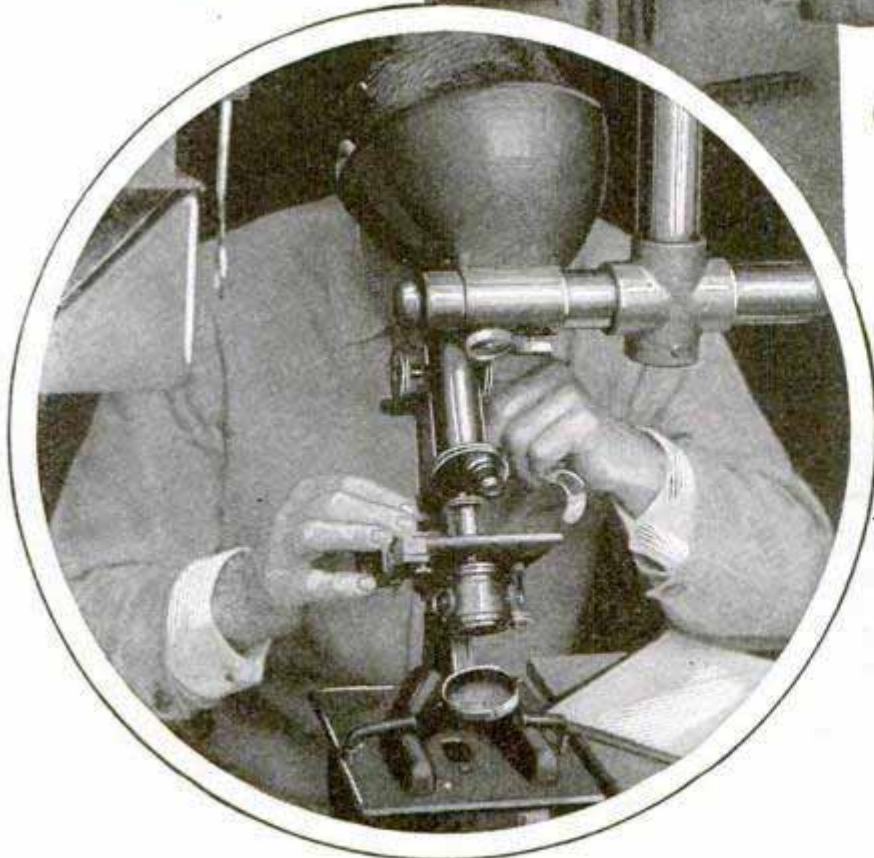


An Artist Is Retained by the Department of Agriculture to Paint Garden Bugs; Below, One of the Special Microscopes Used to Study Minute Organisms That Prey on Animals



abling the observer to see plainly what did not appear under ordinary illumination.

So Doctor Cobb, since then, has been experimenting with various means of duplicating the effect of the sun as seen through a





hazy atmosphere. He tried out glass-walled boxes containing smoke, then fumes of ammonium chloride, next water containing milk, and so on, down through a lengthy list. He achieved an especially good result by the use of a huge sheet of glass very finely etched with acid. Deeply colored glass, especially green or blue, may be used to advantage, he found, so that, with such a glass sheet between the sun and the microscope condenser, the sun's image can be used to search out the otherwise obscure spots.

Those dopesters of the army air corps, mentioned earlier, use such poisons as cellulose acetate and cellulose nitrate for the reason that they tend to fill the pores in the outer fabric of the plane and cause it to shrink, thereby giving it an airtight and smooth surface. The plane as a whole is not covered in this way because that has been attended to by the commercial makers of the ship. It is only the wings that have been temporarily broken and have just been patched up, that need the dope.

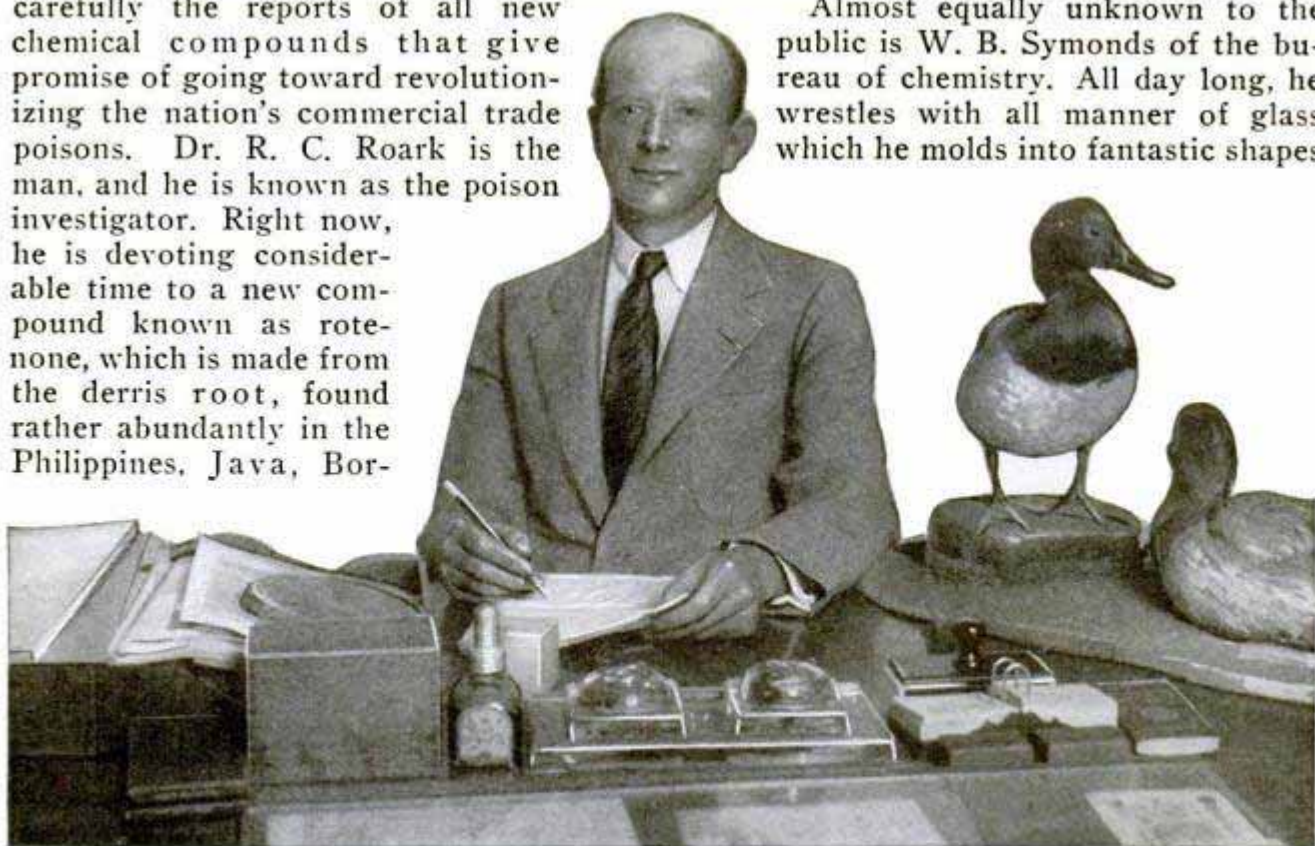
Speaking of poisons, there is an official of the bureau of chemistry and soils whose major task is to watch for and investigate carefully the reports of all new chemical compounds that give promise of going toward revolutionizing the nation's commercial trade poisons. Dr. R. C. Roark is the man, and he is known as the poison investigator. Right now, he is devoting considerable time to a new compound known as rotenone, which is made from the derris root, found rather abundantly in the Philippines, Java, Bor-

neo, Sumatra and the Malay peninsula. It has been claimed, though not authoritatively, that the natives of those places have used the root for the purpose of killing fish, by simply putting a tiny quantity of the poisonous substance in the water, whereupon, within a few hours, the swimmers die and float to the surface to be caught readily.

The claim might be true enough at that, experts say, since tests show that one part in a million can kill minnows with an exposure of twenty-seven hours. But if derris root kills minnows, why doesn't it deal death also to humans? Because it has the peculiar habit of quickly becoming decomposed and inert. Which is why it shows splendid prospects of being valuable as a spray, possibly taking the place of the deadly lead arsenate. Rotenone shows further promise in that it is soluble in certain oils without losing its strength.

A somewhat different study of poisons is conducted under J. W. Sale and J. B. Wilson, of the food, drug and insecticide administration. To them falls the lot of mixing up concoctions that spell speedy destruction to the cockroach and its insect cousins.

Almost equally unknown to the public is W. B. Symonds of the bureau of chemistry. All day long, he wrestles with all manner of glass which he molds into fantastic shapes



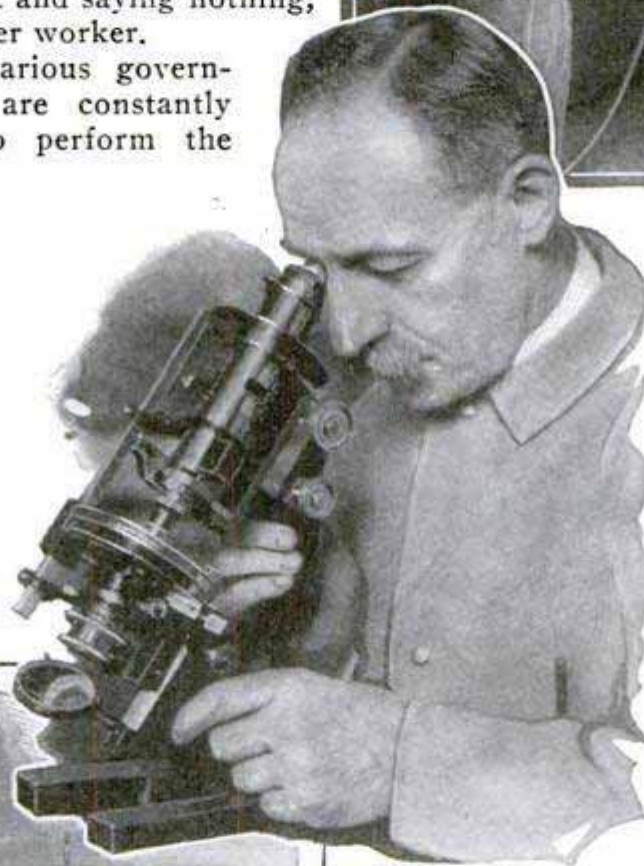
H. P. Sheldon, of the U. S. Biological Survey, spends his time figuring out where the wild birds of the Nation live at various seasons of the year



for famous men who must have, at a moment's notice, the practical results of intricate-looking blueprint ideas.

Who ever heard of "ultra-filtration"? The word sounds highbrow and is, for it must have the guidance of an expert who understands the highly intricate work of filtering carbohydrates (starches and sugars) to just about their finest possible point. Such a man is L. E. Dawson, government chemist, whose efforts in this connection are invaluable to the sugar and candy industries. Like W. B. Symonds, and most of the other government scientists who perform miracles for you and me while sitting tight and saying nothing, he is literally a wonder worker.

Experts in the various government departments are constantly being called on to perform the seemingly impossible. One classic example is the order from Doctor Langley, when he was secretary of the Smithsonian, instructing an aide to drill a hole lengthwise through a needle much finer than those used for hypodermic injec-

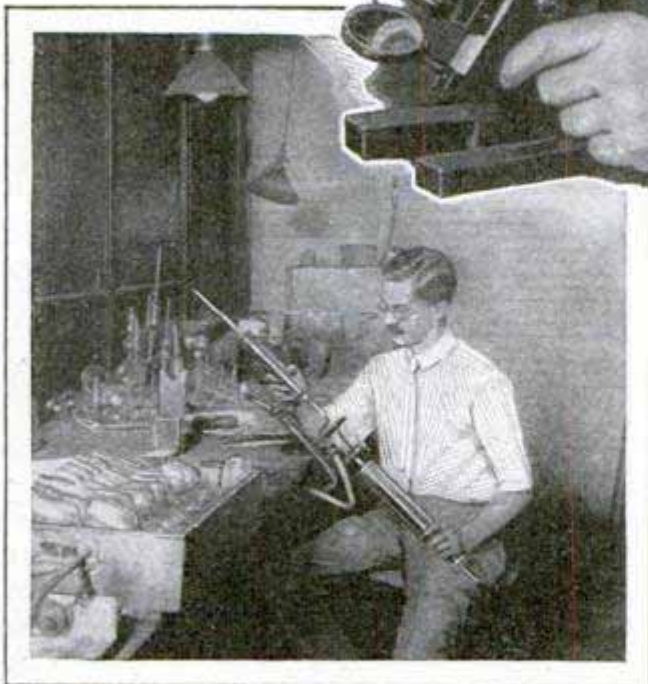


tions. The task was completed successfully.

Recently the bureau of standards, helping prepare a government exhibit to be shown at the Spanish exposition at Seville, Spain, this summer, solved the problem of getting an accurate count of the number of visitors who inspect the American exhibit by building a light-beam counter. A

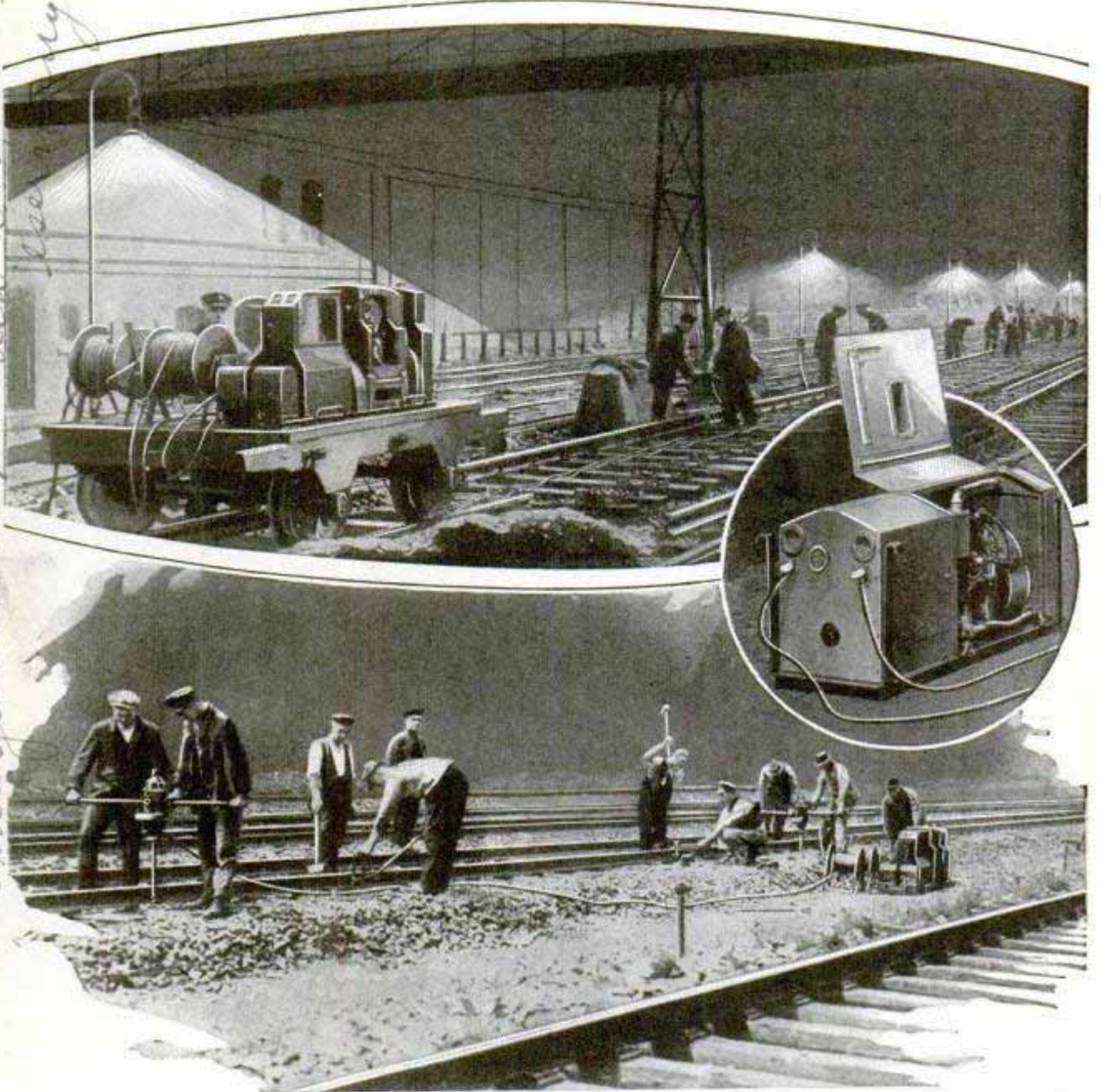
small light is to be placed at one side of the gate, focused on a photoelectric cell hidden in the other side. Every person passing through the gate will interrupt the light, momentarily stopping the current generated in the light-sensitive cell, and this in turn will operate a relay controlling the automatic counter.

The bureau of standards carries out an immense amount of scientific research work. One of its sections does nothing but study fires. A single report, recently issued on the fire-resisting qualities of hollow tile when used in load-bearing walls, fills a volume of over 330 pages.



Chemists Found Milk an Antidote for Poisoning from Aircraft Wing "Dope"; Studying Nematodes Is Doctor Cobb's Job; Bottom, W. B. Symonds Blows All Special Glass Apparatus





Illustrating Some of the Uses of the Portable Electric Plant; Generating Light for Railroad Duty and Furnishing Power for Drills; Inset Shows Close View of Unit

### ELECTRIC PLANT IS PORTABLE FOR LIGHT AND POWER

For service in places where power lines are not available, a portable electric plant, operated by a gasoline or oil-burning

motor, has been devised by German engineers. It furnishes illumination or drives tools of different kinds and is especially adapted for service along railroads. Cables are provided for operating several machines and lights at the same time.

### WOMEN GAINING AS INVENTORS PATENT RECORDS SHOW

In Kansas lives a woman whose chief occupation is raising chickens but she has found time to invent a doll that can walk, dance, sit down, cross its legs and do other things that humans can do. She obtained patents on the doll just recently, thus in-

creasing the growing list of women who are making names for themselves as inventors. Between 1790 and 1910, more than 11,000 patents were granted to women in this country. In England, women were granted 500 patents in one year, and a firm of patent lawyers there reports that more inventions by women are now being handled than ever before. Their

Christian Science Monitor 1/22/29

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Cm. W. Albert Neuburger, New  
Winterfeldstr 24, Berlin W 30

Ms. Clara Mc Cheaters  
Baldwin, Kan.

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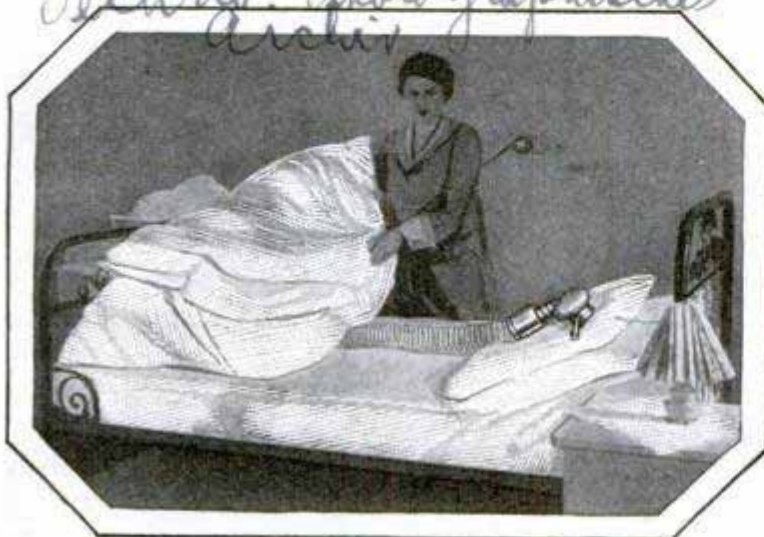
ideas cover not only the household field but extend to aviation, motoring and other activities. Among those winning prize awards from the General Electric company recently, was a woman employe who had developed a means for faster work on the armatures of small washing-machine motors.

### TRACING CLOTH FOR CURTAINS ADMITS HEALTHFUL RAYS

Tracing cloth used by draftsmen in blue-printing drawings may become popular as a curtain material as a result of an accidental discovery that the fabric admits the healthful ultraviolet rays of the sun, usually excluded by paper and other kinds of cloth. It has been suggested that the material be placed in single thickness between wide-meshed wire screens to replace curtains and blinds in dwellings.

### ELECTRIC HEATER WARMS BED AND SERVES AS DRIER

To warm beds, an electric heater, operating on somewhat the same principle as a hair drier, has been introduced in Germany. It is run from a lighting socket and when used in a bed, is placed upon the pillow with the nozzle down and the reverse side exposed so that air can be drawn through openings. The air is heated by the electric element and is fanned down inside the covers, circulation being insured with the aid of a coil spring which is laid lengthwise in the bed.



Adjusting the Bed Warmer; the Blower, with Inlet Holes Upward, Forces Warm Air along Spring Coil



Memorial to Mrs. William Astor as It Appears under Floodlights in Old Trinity Churchyard, New York

### LIGHTS ON CHURCHYARD CROSS REVEAL MEMORIAL'S BEAUTY

Persons working late in Wall street often stop at night to gaze at the illuminated crucifix, thirty-nine feet high, erected some time ago to the memory of Mrs. William Astor. Four floodlights focus their beams on the cross, which is of white marble and stands in the old Trinity churchyard. Besides the figures of Christ and the madonna and child, representations of other Biblical characters are included among the decorations.

¶The Popular Mechanics' Bureau of Information offers its free service to all readers of our magazine. Names of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished by addressing the bureau.

Science Service Bulletin 410 11/31/29

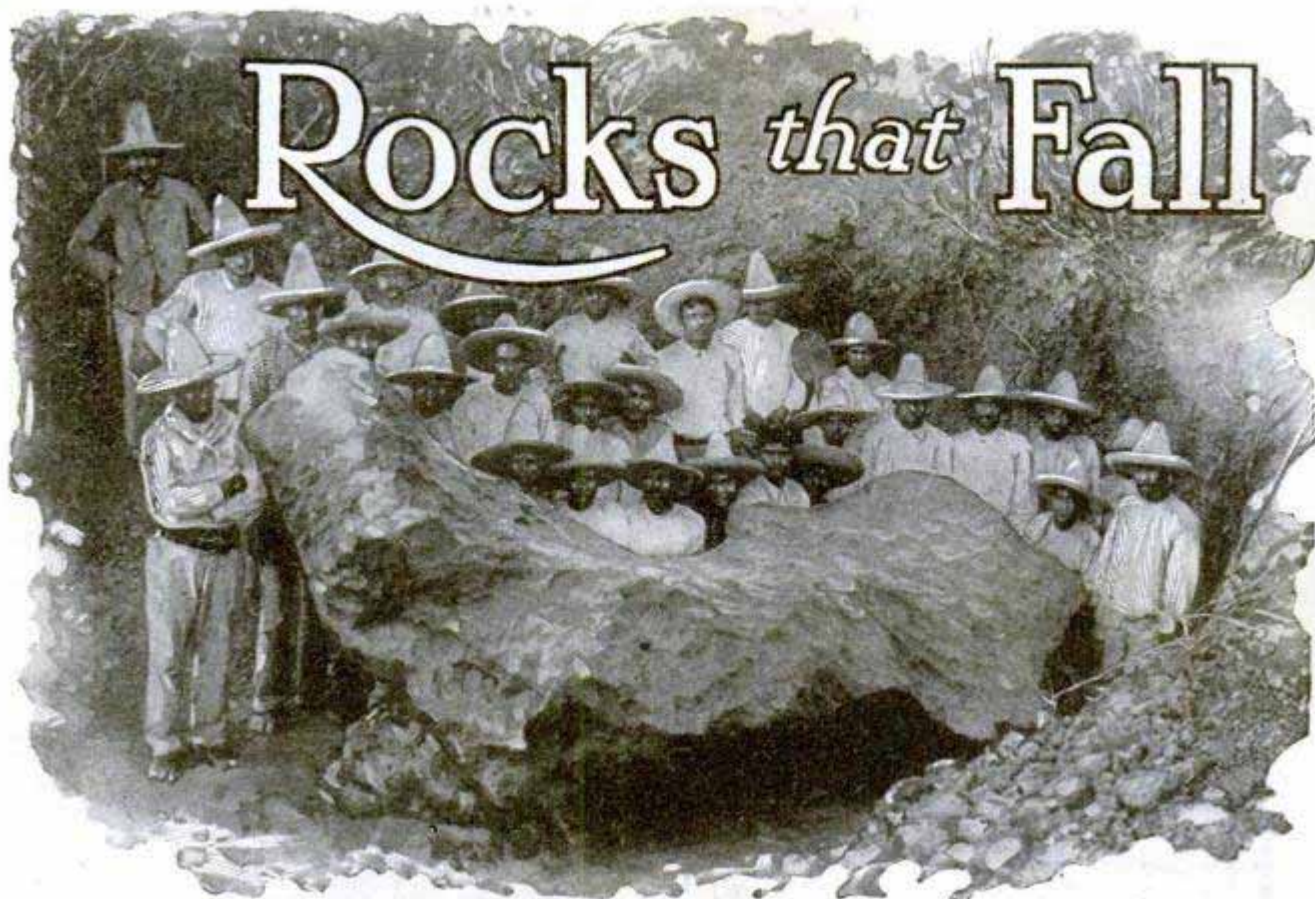
Young Institute University, Montreal, Can. 2/85

Maker. Elektrizitäts-Gesellschaft



2152

# Rocks that Fall



The Bacubirito Meteorite, Second Largest Known Rock from the Sky, Lying at the Point Where It Fell in the State of Sinaloa, on the West Coast of Mexico

*C. B. P. Clogram* By CALVIN FRAZER *1027 840 Washington St.*

ONE REASON why the moon is not fit for human habitation, besides the two well-known facts that it has no atmosphere and is subject to unendurable extremes of temperature, is that it undergoes the incessant bombardment of innumerable meteors. The majority of these bodies are no larger than grains of sand but have great penetrating power, as they fly at speeds ranging up to forty miles or more a second. Many, moreover, are as big as baseballs, and some are great boulders weighing hundreds of pounds or even several tons. A human visitor to the moon would almost certainly be hit sooner or later by one of these deadly missiles.

An interesting consequence of this fusillade of meteors upon the moon has lately been pointed out by Professor Olivier, a leading American student of meteoric phenomena. Astronomers have long conjectured that the so-called lunar craters, instead of being extinct volcanoes, may be the scars left by the impact of giant meteors. Whether or not this is true, says Professor Olivier, it is quite certain that the continual fall of meteors of mod-

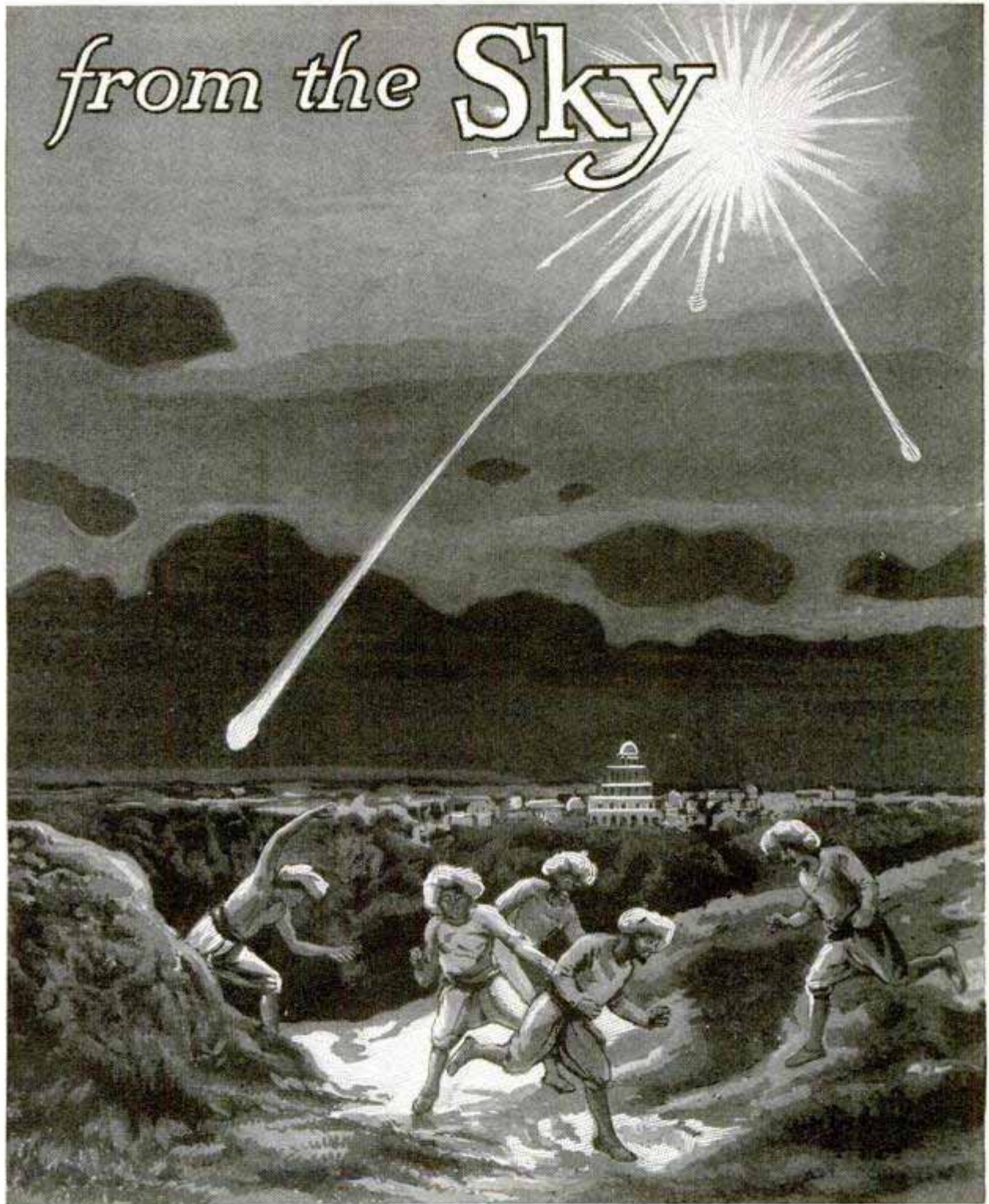
erate size must, in the course of ages, have produced a sort of sand-blast effect upon the lunar surface, quite comparable to the erosion by wind and water that has sculptured the surface of the earth.

Only the presence of a surrounding envelope of air saves our own planet from a similar bombardment. It is estimated that fully 20,000,000 meteors enter the earth's atmosphere every twenty-four hours. The air protects us from these missiles in two ways. First, even in the thin upper layers of the atmosphere, the meteors are intensely heated by friction, and most of them are completely burned up or reduced to an impalpable powder long before they can reach the earth. Second, the resistance of the air checks the speed of those that reach the ground, so that they do not, as a rule, hit the earth much harder than would bodies of the same weight falling from the height of a few miles. The bigger ones fall with much violence, but small specimens have been known to fall on ice only a few inches thick without breaking it.

Meteors that fall to the earth are called meteorites. These vary greatly in size.



# from the Sky



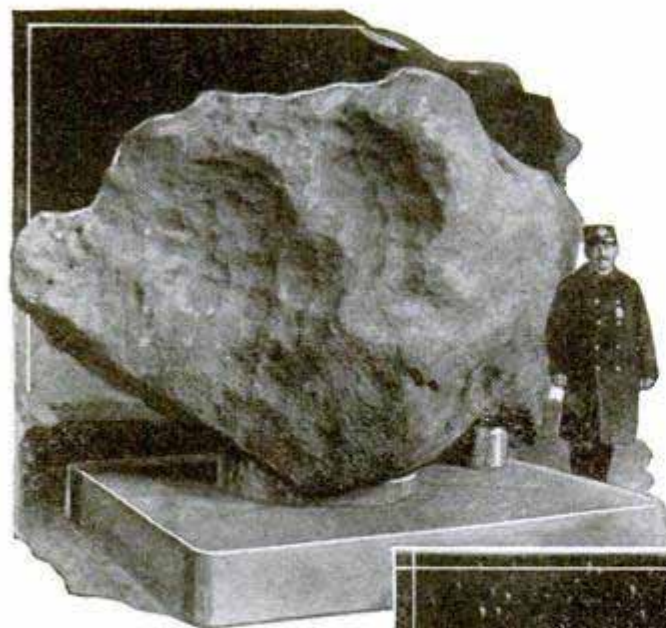
A Bursting Meteorite That Terrified the Natives at Chandpur, Northwest Provinces, India, on April 6, 1885; the Photograph Is Made from a Contemporary Drawing

The smallest thus far found were no larger than grape seeds, while the largest of all is the Cape York meteorite, weighing thirty-six and one-half tons, which Lieutenant Peary brought down from Greenland in 1897, and which is now in the American Museum of Natural History. About half of all the meteorites now preserved in museums were actually

seen to fall. The rest are known to be meteorites because they possess certain features characteristic of such bodies. The museum specimens represent nearly 900 distinct falls, and the total number of meteorites discovered up to date mounts up into the thousands.

Probably hundreds fall for every one that is recovered, but, even so, the fall of





a meteorite is an exceedingly rare event in any one locality. The late Prof. C. A. Young made a rough guess to the effect that the total amount of meteoric matter falling to the earth averages 36,500 tons a year. At first sight, this total seems large enough to make the falling of meteorites a rather serious danger to humanity. It is, however, so small in proportion to the area of the globe that, if the material falling at this rate were spread evenly over the earth's surface, it would make a layer only about an inch thick in the course of a billion years. Moreover, the vast majority of meteorites are too small to be capable of causing much damage.

Nobody need lose any sleep over the danger of being hit by a meteorite. Neither would anybody be justified in insuring his property against a similar danger. If an insurance company could

persuade a large number of gullible people to take out insurance of this sort, the company might operate for centuries without paying out a cent to its policy holders. Nevertheless, in the long run and on the earth as a whole, meteorites do cause a certain amount of damage, and there is a bare possibility that some day a fall of these bodies may be responsible for a more colossal disaster than any volcanic eruption, earthquake or flood that has ever befallen the human race.

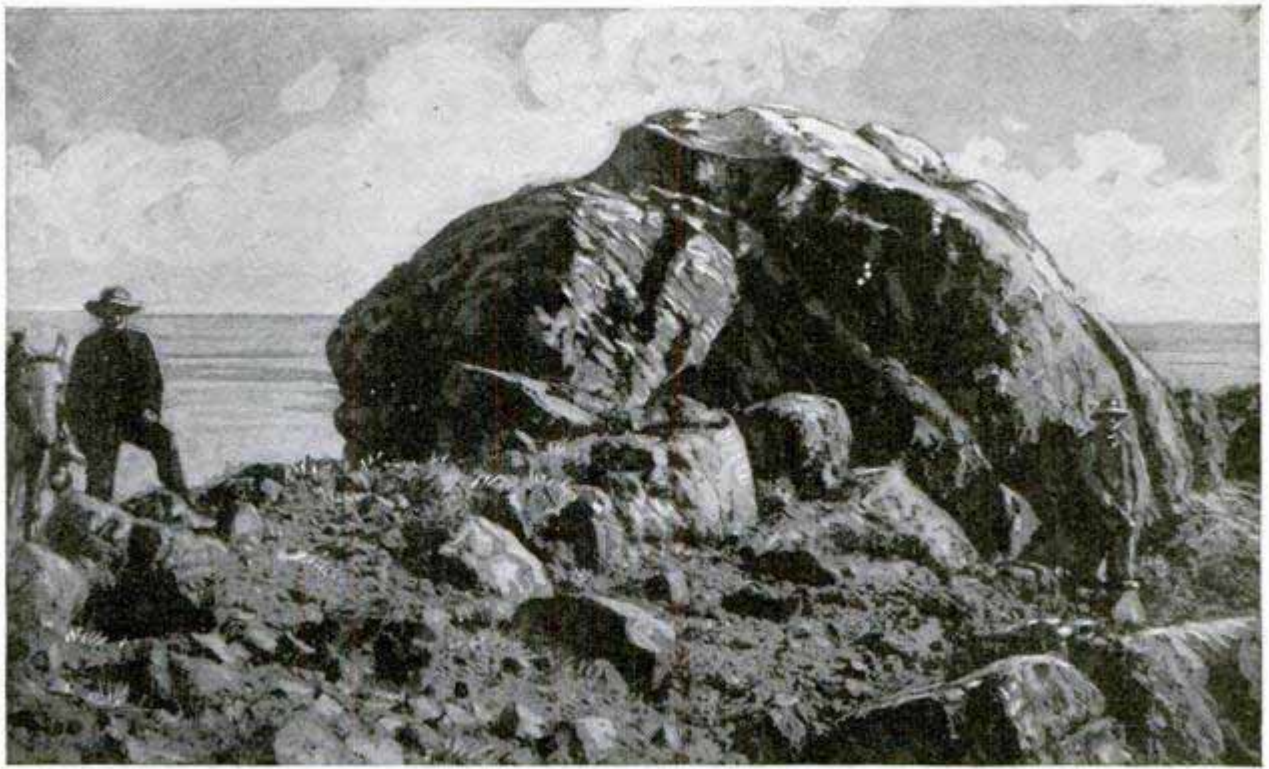
This possibility was vividly brought to mind a short time ago by the belated news

of an event that happened in the wilds of Siberia in the summer of 1908. On June 30, about seven o'clock in the morning, a magnificent falling star, of dazzling brilliancy, was observed in the northern sky by thousands of people in the southern part of the province of Yenisei. The place of fall long remained a mystery, but in the summer of 1927, an expedition under Prof. L. A. Kulik located it in the midst of an almost inaccessible forest lying north of the "Stony"



Peary's Cape York Meteor; Halley's Comet, Parent of a Swarm of Them, and Meteor Crater as Seen from the Air; the Black Specks in the Foreground Are Trees





On the Rim of Meteor Crater, the Vast Hole in Arizona Which Has Puzzled Science; the Rim Is Lined with These Huge Boulders, Thrown Up by the Violent Impact

Tunguska river, in about latitude 61 degrees north and longitude 102 degrees east.

This region is very sparsely inhabited by half-civilized Tunguses, and this fact, together with a complete lack of roads and telegraph lines, explains why details of the meteor fall were so slow in reaching the rest of the world. Kulik has recently returned to civilization with a wonderful story of what he found. Where the meteorite struck, there is now an area several miles in diameter where the earth is torn and furrowed as though by a gigantic harrow and pitted by large funnel-shaped cavities, like shell holes. Around this central area, in a circle scores of miles in diameter, millions of dead trees lie like a vast forest of fallen ninepins. They are all stripped of their bark and branches, and each tree lies with its top pointing outward from the center of the devastated area. All the vegetation for miles around shows the effects of a uniform scorching, quite different in appearance from that caused by a forest fire.

Evidently a meteorite of extraordinary size burst in mid-air and rained down its fragments upon the earth, or else the falling material consisted of a swarm of meteorites traveling together through space.

The sudden compression of the air under these falling masses must have generated great heat and sent out in all directions a hurricanelike blast that felled and shattered the trees. The outrush of this hot air was actually observed by several natives in the surrounding country. One man, forty miles from the place of the fall, was hurled several feet by the air wave, which felt so hot that he thought his clothes would catch fire. His house was wrecked by the same wave.

Another man had stores and a herd of 1,500 reindeer in the forest at the time of the fall. Only a few scorched carcasses of these animals could be found after the event; the rest were completely annihilated. The storehouse was burned down, and a number of tools that it contained were melted. At Lalka, 400 miles from the center of disturbance, railroad employes felt the air wave and heard a roaring sound. Even at the observatory of Irkutsk, 800 miles away, the air wave was registered by a barograph, and the shock of the falling mass was recorded by a seismograph. No specimens of the meteoric material have yet been recovered from this fall. The fragments are probably buried deep in the earth, and it would be a difficult task to transport to the spot



suitable tools for digging them up, but this will doubtless be done eventually. A survey of the region by aeroplane will probably be carried out next summer.

As one part of the globe is as likely to be bombarded as another, it was merely a lucky chance in this case that directed the celestial missiles toward a wilderness rather than toward some densely populated region. If London or New York, for example, had been the target, the results would certainly have been appalling. Millions of lives would have been lost, and billions of dollars' worth of property would have been wiped out. It is comforting to reflect, however, that such a meteor fall as occurred in Siberia is almost unprecedented in the world's history.

Almost, but not quite. About thirty-five miles east of Flagstaff, Ariz., near the long ravine known as Canyon Diablo, there is a remarkable craterlike hole in the ground, 4,000 feet in diameter and 600 feet deep. No evidence of volcanic activity exists in the neighborhood, and though at one time there was much controversy in scientific circles about the origin of the hole, it is now generally admitted to have been formed by the fall of a huge meteorite or cluster of meteorites. A great number of iron meteorites have actually been found within a few miles of this spot. The principal mass of material is supposed to be buried hundreds of feet underground, and several unsuccessful attempts have been made to reach it, on account of the probable value of the meteoric iron, to say nothing of the chance that it may con-

tain diamonds, which have occasionally been found in meteorites.

The walls of this curious formation rise well above the surrounding desert, so that, at a distance, it looks an isolated hill of the flat-topped variety common in the southwest, and it was formerly called Coon Butte, but is now known as Meteor Crater. Trees growing on its side are fully seven hundred years old. On the other hand, the crater shows but slight indications of erosion, so that it cannot be very ancient. Navajo Indians living in the neighborhood have a tradition that fire once fell from heaven and destroyed members of their tribe. Probably the meteor fall that produced the crater happened well within the span of human history, and at a time when civilized communities and flourishing cities already existed in some parts of the world.

A few other craterlike formations on the earth, including one recently discovered in Esthonia, may possibly have been due to meteoric bombardment, but there is no convincing evidence that they originated in this way. Turning, now, to some of the more definitely recorded effects of falling meteorites, we find that in perhaps a dozen cases—most of them dating back many centuries—people were said to have been killed by meteorites. The evidence in all these cases is too uncertain to be conclusive, but, of course, such an event is entirely possible and has probably happened more than once. There have been some narrow escapes even in modern times. Thus at Braunau, Bohemia, in



**A View across Meteor Crater from the Southeast Wall; Recent Tunneling Has Convinced the Owners the Huge Mass of the Main Meteor Has Been Located Far Underground**

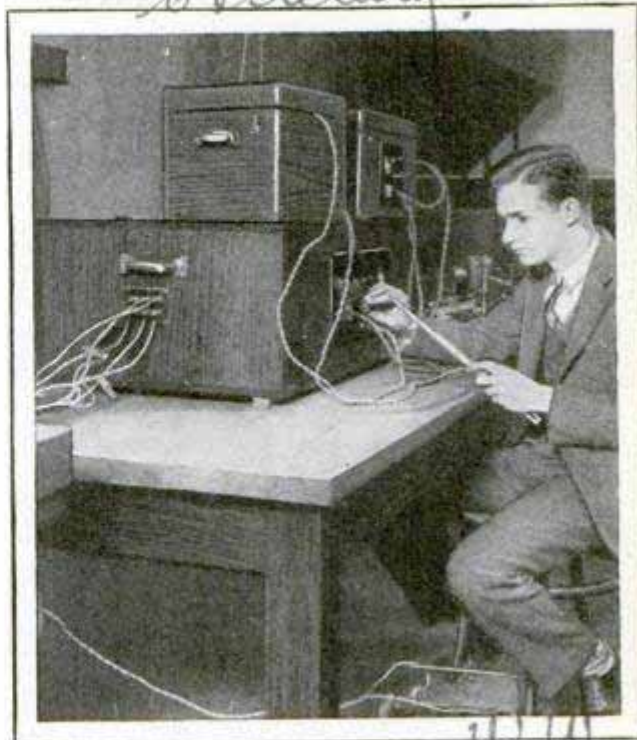


1847, an iron meteorite weighing nearly forty pounds fell in a room where some children were sleeping and covered them with debris, but did them no serious harm. At Charsonville, France, a meteorite fell on a road between two teamsters, throwing up the ground to a height of six feet. Roofs have been penetrated in several cases. A dog was killed by a meteorite at Nakhla, Egypt, in 1911.

Stories of buildings being set on fire by these bodies are usually taken with a grain of salt by the authorities. The scorching effect of the great Siberian fall was probably due, wholly or mainly, to the compression of the air and was altogether exceptional. Ordinary meteorites are heated to an enormous temperature during their passage through the air, but the heating is so brief that it is a mere skin effect and the heat is quickly lost when the object comes to rest. Meteorites found immediately after their fall are generally cold or lukewarm, though some have been described as "too hot to handle." No baking of the ground or charring of vegetation has ever been observed at the place of fall, except in the one case mentioned.

## NINE-HOLE INDOOR GOLF SET IMPROVES PUTTING

Competitive features help make an indoor golf game more interesting and give the players valuable practice in putting and other strokes. The set is a miniature nine-hole golf course, the object of the game being to sink the balls in the holes from the tee and thereby score the points indicated for each hole on a small flag that automatically turns to designate the score when a ball has been sunk. Each player gets nine balls to the game and may play the holes in any order desired. Balls returning down the slope may be played over, those remaining on the field should not be removed until after the game and those that bounce off the board cannot be played over.



Part of the Apparatus Used to Test the Speed of Winds in Tunnel Experiments with Airplanes

## HOT WIRE MEASURES WINDS IN AIRPLANE TESTS

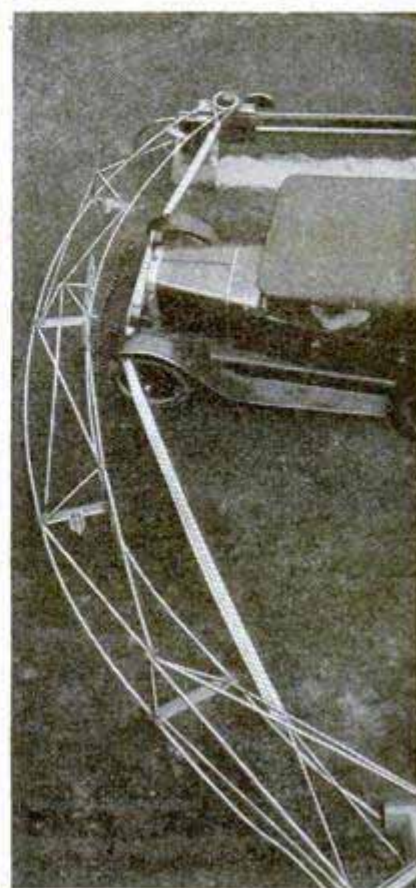
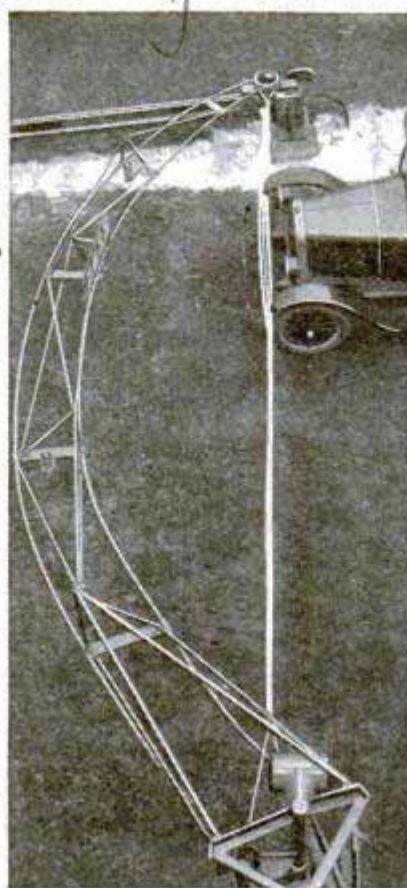
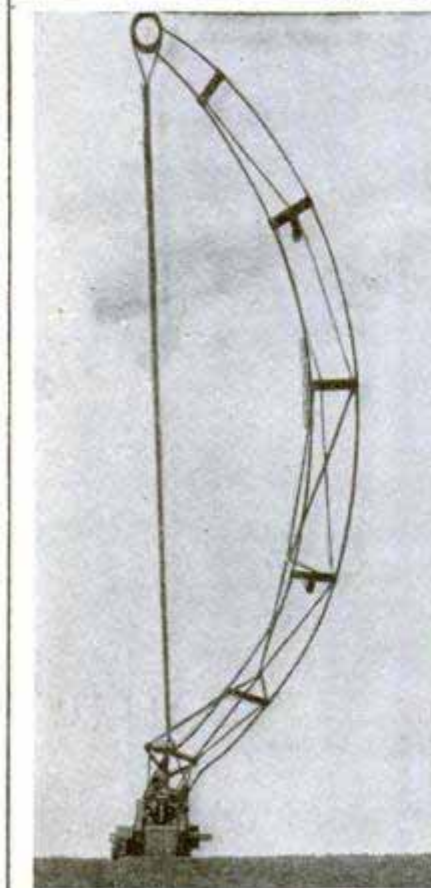
One of the interesting details of apparatus used by the bureau of standards to gauge the velocity of winds in the test tunnels, where experiments on model airplanes are conducted, is a hot wire. It is about one-fifth the diameter of a human hair and is electrically heated. Used in connection with an amplifying set, it gives an accurate measure of the speed of the winds as they pass in waves and ripples around the planes under test.

## ELECTRIC EYES REPLACE MEN AT POWER PLANTS

Power stations that run themselves and are watched by electric eyes which record their impulses miles away, are releasing men, who previously performed important but minor duties, to more active and responsible positions in the electrical world. The innovation suggests the time when television may be harnessed to aid the electrical dispatcher, but at present the method is too costly and is not practical. Essentially the same results are being accomplished by the remote-control system. Signals are sent to a central point and duplicate, on dials and in records, the readings on the instruments in the manless power plants.

219 Aerodynamical Secretary  
2192  
4250.00  
4  
Described at  
meeting, American Institute of Electrical Engineers  
General Electric Co.





Gate as It Appears When Raised; Auto Striking the Cable and Then Stopped by the Action of the Snubbing Mechanism, Which Is Visible in the Upper Part of the Two Photographs at the Right

## SAFETY GATE STOPS AUTOS AT RAIL CROSSINGS

To prevent accidents at railroad crossings, a safety gate that halts automobiles before they reach the track, has been introduced. It consists of a road arm, raised and lowered like the ordinary crossing gate, but, in addition, it has a cable loop which engages a snubbing device. Should the car be driven against this loop, the cable, anchored to the snubbing post which progresses along a guide way, its movements being opposed by friction or by hydraulic means, gradually brings the automobile to a stop without injury to the driver or damage to the car. Under a test, a ten-ton truck, driven at a speed of thirty-five miles an hour, was stopped in this way without mishap.

## HEATING RIVER WITH STEAM PREVENTS FREEZING

In 1776, the East river froze sufficiently to allow an army to cross the ice in safety. But the stream no longer does that near New York, for every hour some 400,000

tons of heated water and steam are sent back into the river from the big power plants along its banks. The water is used in condensing steam at the plants. Engineers estimate that the return raises the temperature of the entire stream at that point at least ten degrees in spite of the tidal currents that flow in from Long Island sound and New York harbor.

## CARD HOLDER FITS ON FINGERS TO SIMPLIFY PLAYING



Persons who have difficulty in holding their cards at bridge or other games are served in a celluloid holder that is fastened to the fingers with a silk band. It permits arranging the cards easily.

Flies have their organs of taste located in the feet.

W. H. Walling

Loyal Products Co. Inc.

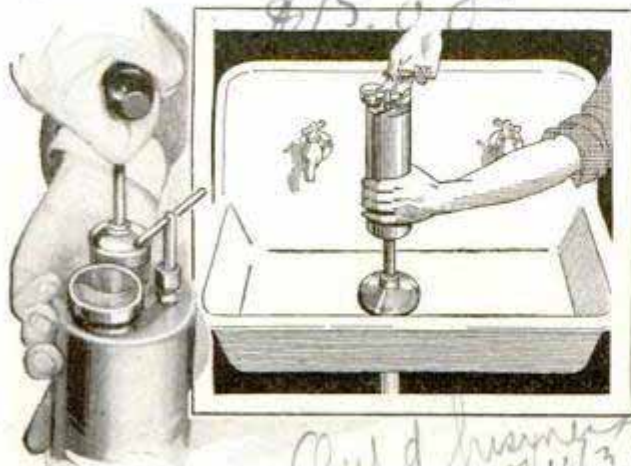


## THIEF SNARED BY BLUE POWDER SPRINKLED ON PURSES

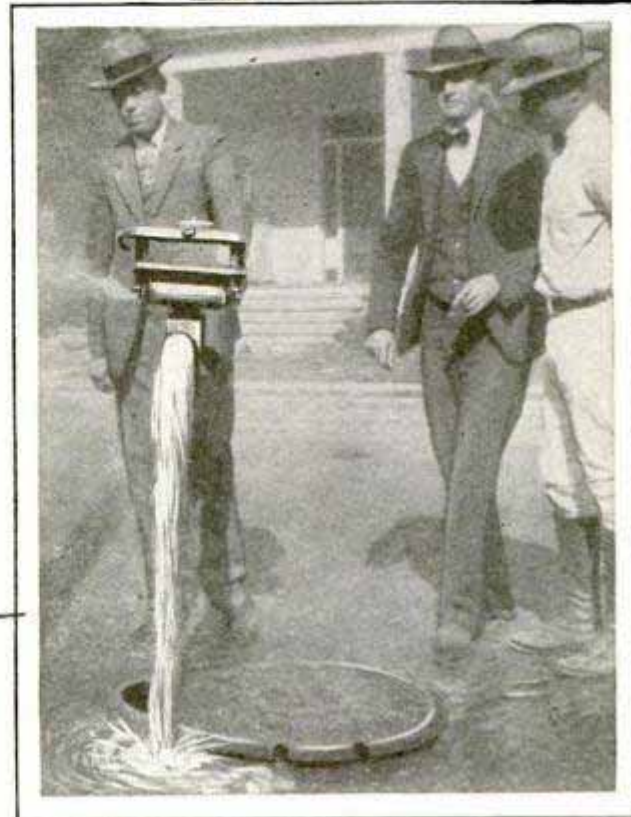
A kind of powder that turns an indelible blue when it comes in contact with moisture, was successfully used by Scotland Yard detectives the other day in catching a thief who had been taking pocketbooks from a girls' school in London. The powder was carefully sprinkled on purses placed as decoys for the suspect, a porter at the school. They disappeared, and the employe was accused of the theft. He indignantly denied the charge, but his hands were stained a bright blue, a fact that caused him to admit his guilt. The perspiration of his hands had caused the powder, falling from the purses, to change color.

## AIR GUN TO CLEAN OUT DRAINS SAVES PLUMBING BILLS

When drain pipes become clogged, an effective way to clear away the obstruction is afforded in a compressed-air gun which releases an instant blast at thirty to eighty pounds' pressure. It is pumped up by a hand plunger, a gauge at the top showing the exact pressure, and the air is released simply by lifting a trigger valve. Attachments are provided for using the gun to the best advantage in different places, such as in sinks, washbowls and other units. A reversible rubber cone makes a leak-proof connection between the gun and the drain to be cleaned. Lengths of hose can be used for insertion into crooked pipes. The device has been found especially adapted to cleaning filling-station and soda-fountain pipes.



Gun in Position for Being Pumped Up, and Drawing to Illustrate How It Is Used on Sink



Outboard-Motor Pump in Operation and as It Is Carried to Save Hauling

## PUMP RUN BY OUTBOARD MOTOR SERVES CONTRACTORS

For draining excavations, manholes and similar work, a portable pump that can be carried on the shoulder, is operated by an outboard motor. It will pump nearly 200 gallons of water per minute, saves time and work in moving and is quickly set up. A special feature is the automatic shut-off. A safety device stops the pump when water ceases passing through it.

## BOY DISCOVERS NEW EXPLOSIVE AND WINS SCHOLARSHIP

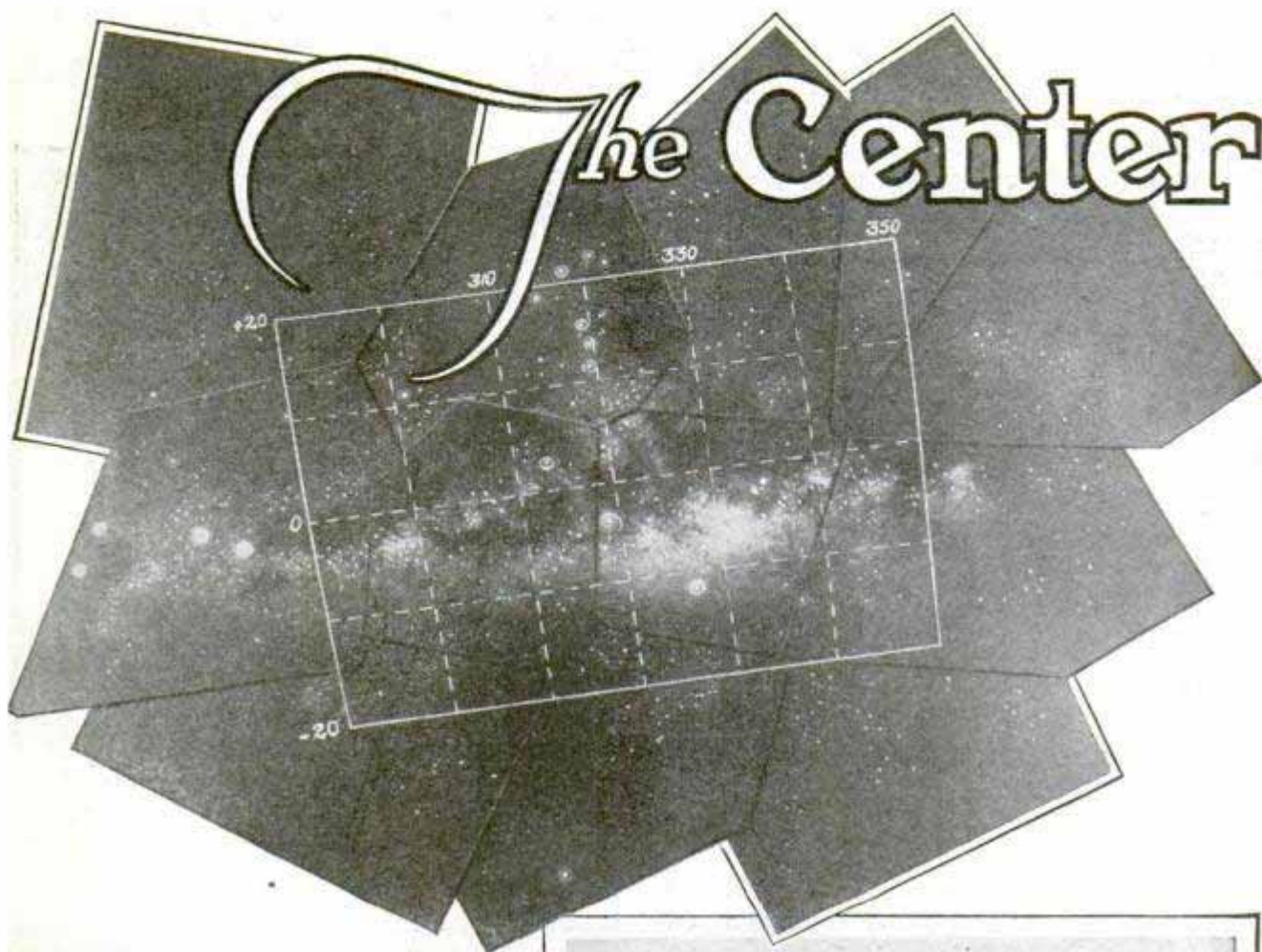
His interest in chemistry has proved valuable to Edwin Mulvaney, a Chattanooga, Tenn., high-school student. He constructed a small laboratory at home and experimented with chemicals, particularly those of an explosive nature. One of his mixtures was described to the chemical-warfare laboratories and pronounced a wholly new explosive. The boy chemist was awarded a four years' scholarship at the laboratories.

Handwritten notes and signatures at the bottom of the page, including "Edwin Mulvaney" and "Edwin P. Walker".



1921

Comr. George A. ...  
 R. 809. 537 S Dearborn, Chicago



By JOHN T. BRADY

WHERE in the heavens should we look for the actual center of the visible universe, or to be more precise, the central nucleus of our galaxy, the discovery of which has been officially announced by Dr. Harlow Shapley, director of the Harvard astronomical observatory, after years of painstaking research by himself and his associates?

Can it be seen with the naked eye? How far away is it, and what are its dimensions and its composition? Is there a massive core, or nucleus, a supercenter of gravity around which our whole solar system rotates, much as the earth does about the sun? Is it an ordinary collection of bunched stars comparable with that in the vicinity of the sun, or are we in an enormous pinwheel, or spiral nebula, that is swishing the earth around through space on one of its tails, like a boy hanging on for dear life near the end



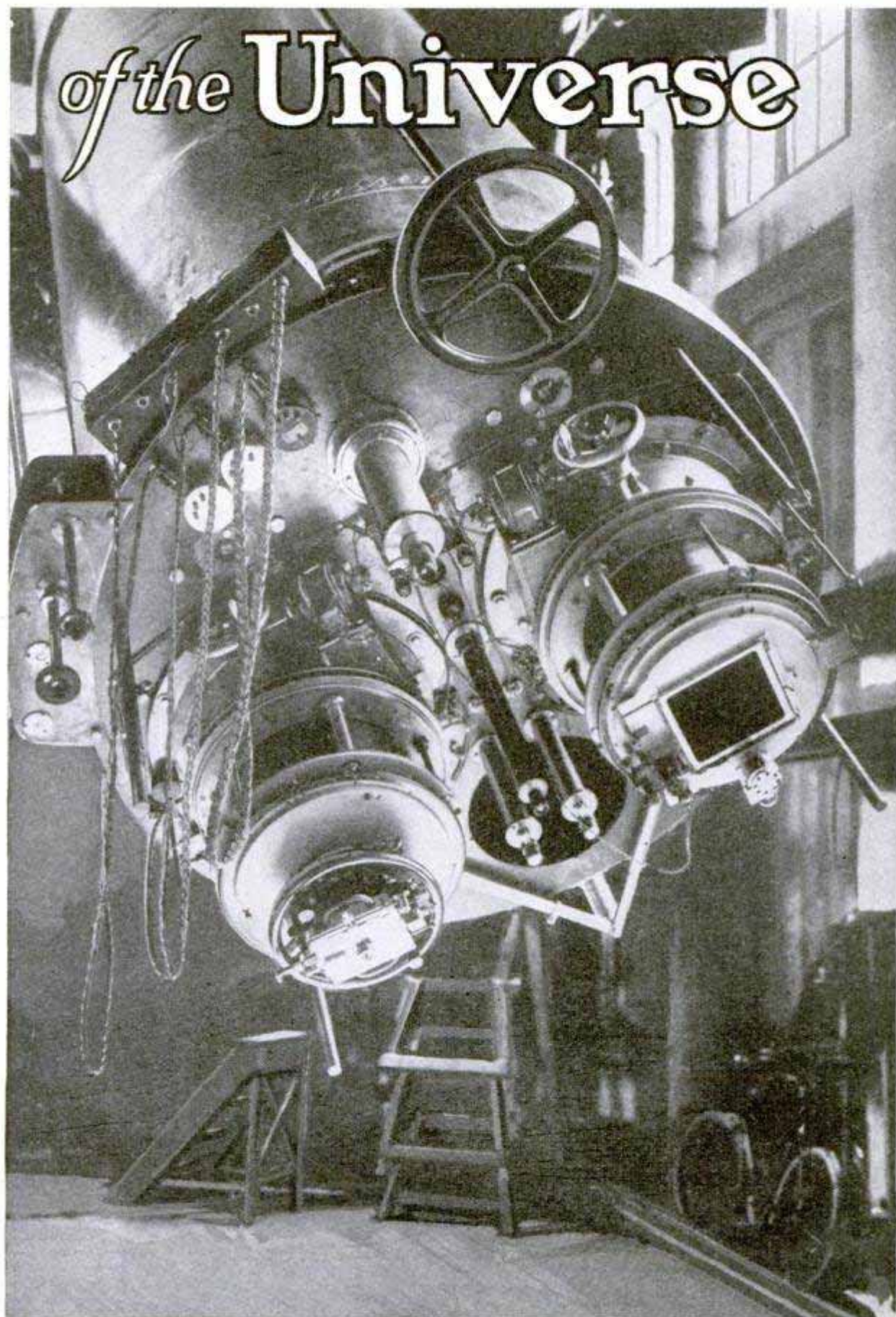
Composite Photograph from Harvard-Observatory Plates, Showing the Point in Sagittarius Fixed as the Actual Center of the Visible Universe, Top, and a Diagram Showing the Universe as a Flattened Disk; the Circle Marks Our Own Solar System

of the line in a game of "snap the whip"?

For centuries astronomers have speculated on the problem of the center of the universe. It has gripped their imagina-

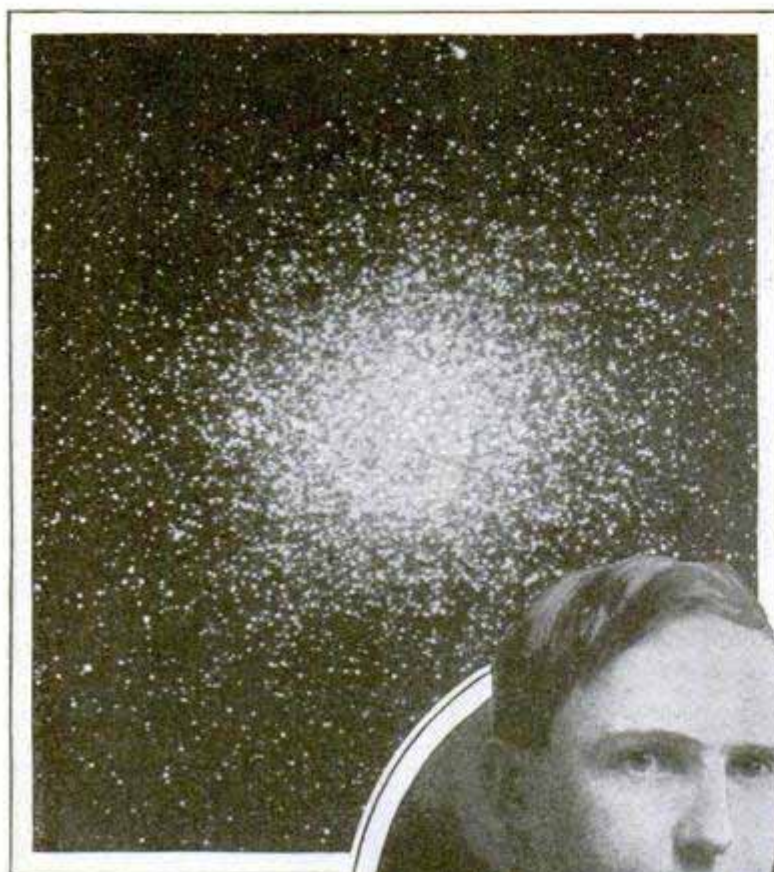


# *of the* Universe



The Eyepiece End of a Big Telescope; This Instrument Has Been Built for an Observatory at Kembang, on the Island of Java, Where Conditions Are Good for Observation





tion much like the prospect of making gold from baser metals enthralled the fancy of the alchemists of old. But until quite recently, in fact, until Doctor Shapley perfected methods of measuring star distances photometrically and applied these methods to the problem of the distances and structures of the star clusters, the solution remained an elusive mystery.

Ancient astronomers, whose observation of the stars was limited to what could be seen with the naked eye as they tended their sheep, saw only four or five thousand altogether—hardly two thousand at any one time—and believed the earth was the center of the universe.

A natural vanity led most early speculators to this assumption, in Doctor Shapley's opinion, and it is not yet extinct. But with the development of the telescope, which enabled the scien-

tific star gazer to probe deeper into space, sun worship began to die out in the ranks of the philosophical astronomers. Gradually they began to realize that our sun was but one of many millions of stars, and a very tiny one at that.

Then speculation as to the center of the universe began to run riot, and various celestial objects, such as Sirius and the Orion nebula, were suggested as being the central place. Measurements of the motions of stars, suggesting rotation about some central mass or masses, led, within the last century, to the notion that the Pleiades or Perseus clusters might be the controlling bodies, and more recent extensive star counts induced various investigators to locate the center in the Milky Way.

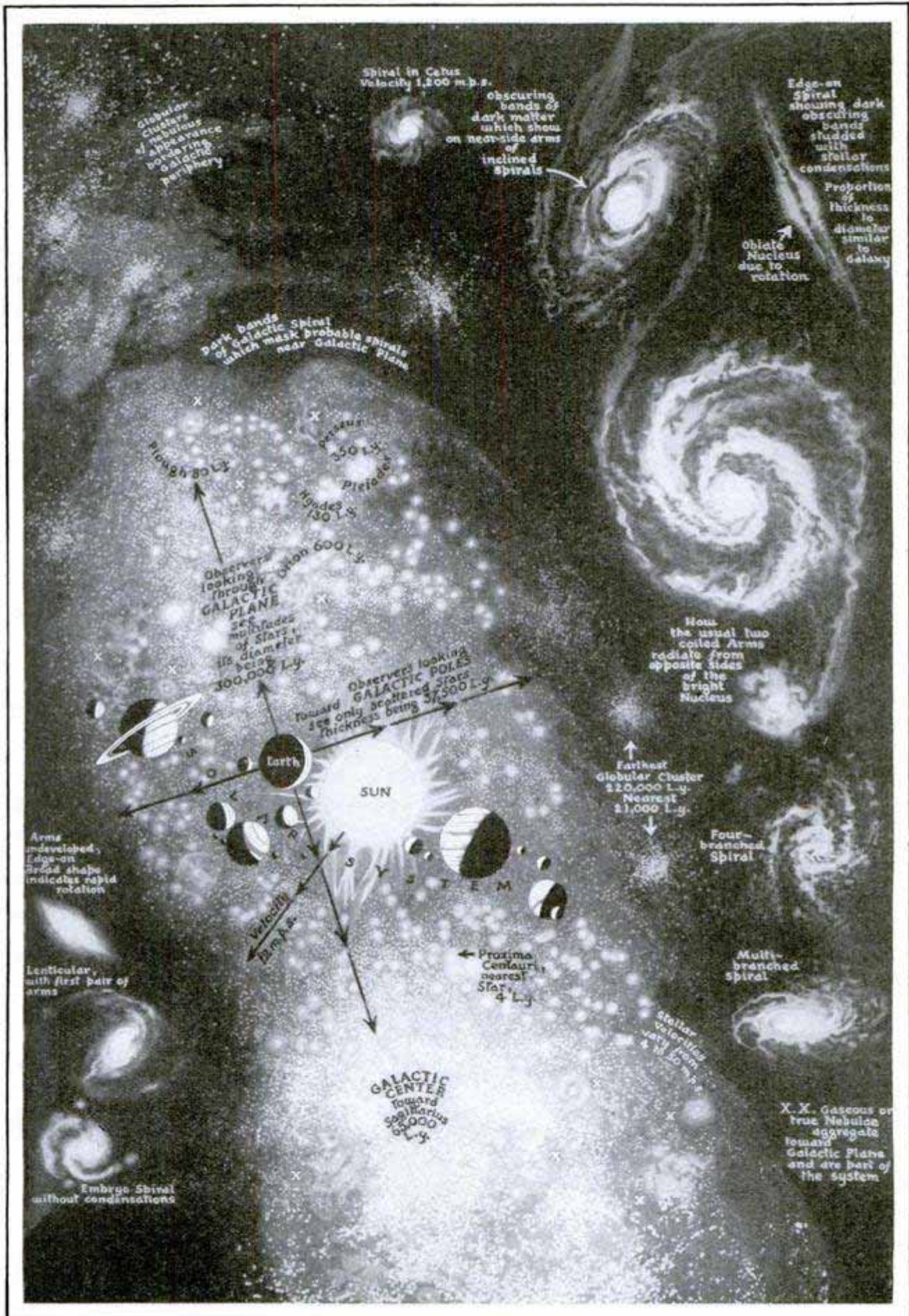


des or Perseus clusters might be the controlling bodies, and more recent extensive star counts induced various investigators to locate the center in the Milky Way.



Dr. Harlow Shapley, of Harvard, and, Top, Omega Centauri, a Globular Star Cluster in the Southern Milky Way; Bottom, the Southern Milky Way Itself





Copyright, S. W. Clatworthy

**Diagram of the Universe;** the Abbreviation "L. Y." Means Light Years, the Distance Light, Traveling at 186,000 Miles a Second, Will Go in One Year; This Is the Astronomers' Measuring Unit



Doctor Shapley carefully explained that he had discovered the nucleus of only that universe with which astronomical science is familiar and which it can measure at the present time, or in other words, the center of one particular comprehensible universe, and not the center of centers of all stellar creation.

So he describes his discovery as the nucleus of that group of stars of which our sun is one infinitesimal member, and which doesn't include the tens of thousands of other universes that lie beyond the limits of our galaxy.

"Really what we have found," he went on, "is the central nucleus of a large, very much flattened cookie-shaped system, somewhat irregularly circular, that is composed of perhaps 30,000 million suns. That's the best numerical estimate we have, but I think the actual number is very much above that figure. And sprinkled around among them may be any number of planets which we cannot see.

"Our sun then is one of about 30,000 million stars that form a great organization called the galaxy, and the planets, such as the Earth and the others that we see in our solar system, are a very insignificant part of it.

"When we begin thinking about finding the center of the galaxy, therefore, we are faced with a curious problem, for here we are on a tiny little planet going around a dwarf star, and as we look out into space, we see stars in all directions, the nearest one to us being our sun, 93,000,000

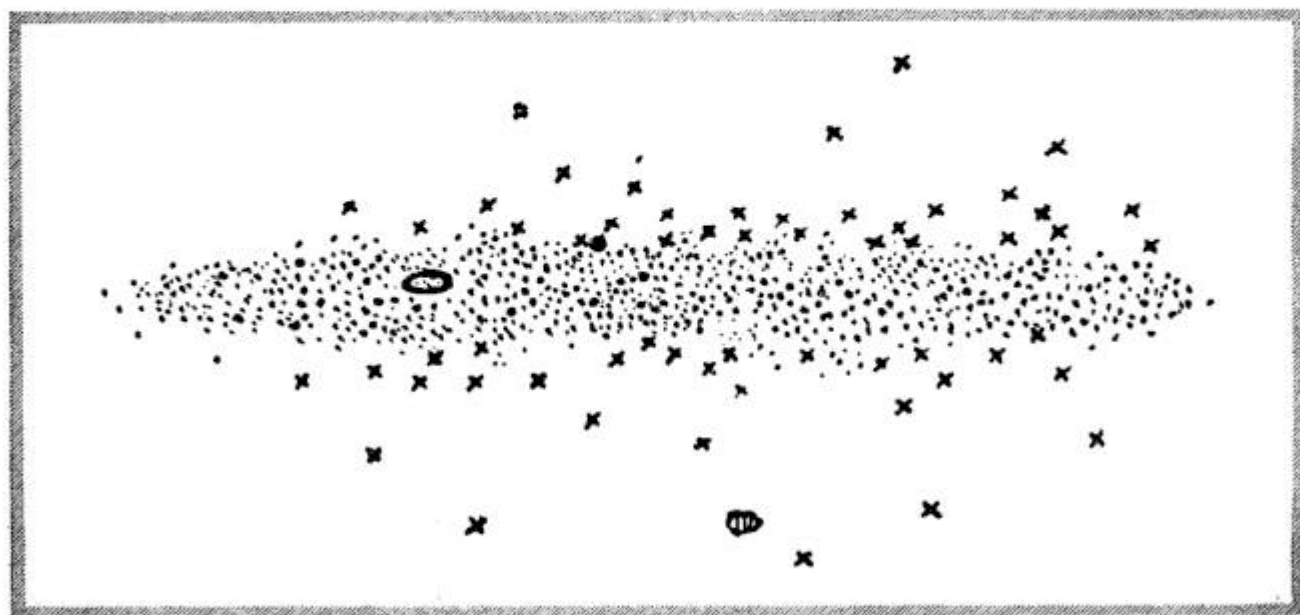
miles away, and it is twenty-five trillion miles from our solar system to the nearest star."

Doctor Shapley took up this problem in 1915 while he was attached to the Mt. Wilson observatory, at Pasadena, Calif., prior to coming to Harvard, and the method he developed then of measuring star distances photometrically introduced a revolution into the concepts of the universe and paved the way to the discovery of the center of our galaxy. At that time, the diameter of the Milky Way was estimated at 20,000 light years and our sun was thought to be near the center of it.

Realizing that the globular star clusters, which are especially numerous in the southern Milky Way, would be of much importance in studying organizations of the higher orders, and particularly useful in helping to measure the dimensions of our star system, Doctor Shapley first undertook to measure the distances of about seventy of them, all that were then certainly recognized.

And in studying the famous star cluster in the constellation Hercules, known as "Messier 13," for example, he found its distance to be about 35,000 light years from the earth. Small stars among the 50,000 in this group were found to be 100 times as large as our sun, while the more brilliant were a thousand times as big as Old Sol.

"All of the globular clusters were found to be immensely remote," he explained, "and at the same time their distribution is



Our Galaxy as Seen Edgewise, the Small Circle at Left Marking Our Solar System; the Crosses Represent Globular Star Clusters Outside Our Galaxy, as Diagrammed by Doctor Shapley



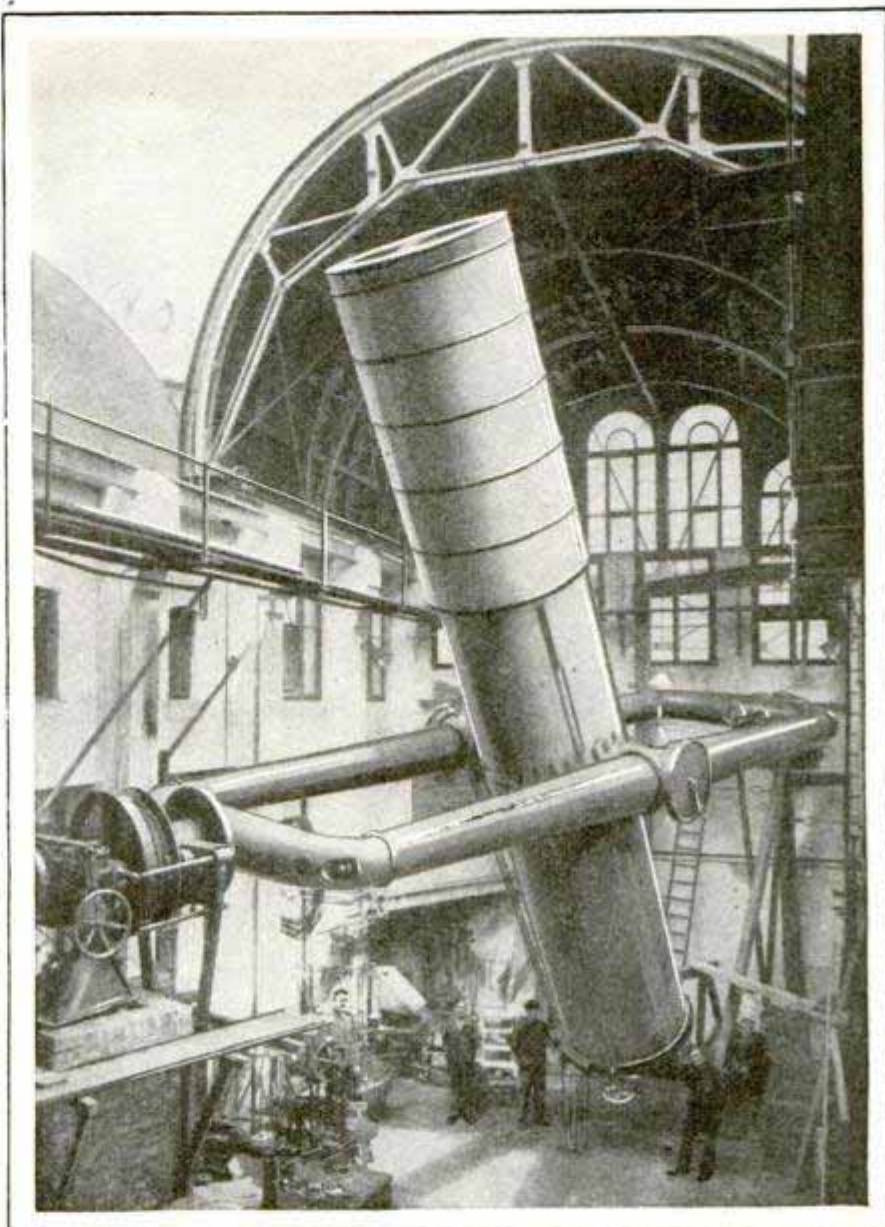
such that we can derive from it the form and extent of our whole star system, since they are certainly part of our galaxy, and probably outline the whole system of thousands of millions of individual stars. The most remote of these star clusters is so deep in space that light from it requires 2,000 centuries to reach the earth, notwithstanding its inconceivable speed of over 11,000,000 miles a minute.

"Analysis of the distances and distribution of the globular star clusters indicated that they form a greatly flattened, irregularly assembled stellar system, and that our sun is not in the center of it or anywhere near the center, but halfway toward the outer edge.

"I got a distance of 200,000 light years as the diameter from one edge to the other, and all my measurements and the high concentration of the globular clusters in the constellation Sagittarius (The Archer) intimated

that the center was in that region. In order to check up on this, I started, here at Harvard, several years ago, a systematic investigation of the variable stars in a belt twenty degrees in width. To cover thoroughly the Milky Way, we divided it into 240 fields, and ever since, night after night, we have been photographing it with four telescopes. The study of these plates will enable us to measure the distances of the variable stars, and a knowledge of their distribution in space will give us more light on the structure of our own galaxy.

"About three-fourths of all the variable stars ever discovered, by the way, have been found by Harvard observers, and the total was only in the neighborhood of 5,000 up to about a year ago. But within



The New Twenty-Four-Inch Telescope for the Javanese Observatory at Kem-bang Has a Six-Foot Tube, Forty-Six Feet Long

the last year we have found about 1,000 new ones. We expect the search to go on for ten or fifteen years before we have found all the variables.

"One of the first results of our concentrated effort to fathom the depths of the Milky Way came when, with the able assistance of Miss Henrietta Swope, we found a heavy concentration of stars in the constellation Sagittarius at a distance of 47,000 light years from the earth.

"Already a dozen or so clouds or clusters of the remote Milky Way have been found on the Harvard plates, one of which shows a special cloud of nebulae in the constellations of Coma and Virgo, off 10,000,000 light years from our galaxy. Its center is the center of one of the universes of universes.



"But the solution of the mystery of the direction and distance to the center of centers—to that remote point in space which is the center of gravity for all the tens of thousands of galaxies—will have to await the completion of our nebular survey which will take from ten to fifteen years more; and it may never be solved."

There is pretty good evidence to show that our whole solar system is rotating about the nucleus in Sagittarius, according to Doctor Shapley, and he is supported in this view by conclusions drawn by observers all over the world. Doctor Shapley estimates the speed of rotation at about 200 miles a second, and looked at from the north side, the direction of rotation is clockwise.

Unfortunately the actual central point of our galaxy, as determined by Doctor Shapley, is hopelessly obscured from our vision by impenetrable clouds, he explains, but if you are curious to see how it appears to the naked eye, look for it in the southern Milky Way at a point where Scorpio, Ophiuchus and Sagittarius corner together. In the spring, it will be seen due south in the early evening.

"What we seem to have found," continued Doctor Shapley, "is definite evidence that the Milky Way has a massive nucleus composed of billions of stars located in the direction of Sagittarius, but so large that it flows over into Scorpio and other constellations. This nucleus has a diameter of probably 25,000 light years.

"But beyond the limits of our star system, nebulae are scattered through space. They turn out to be other stellar systems,

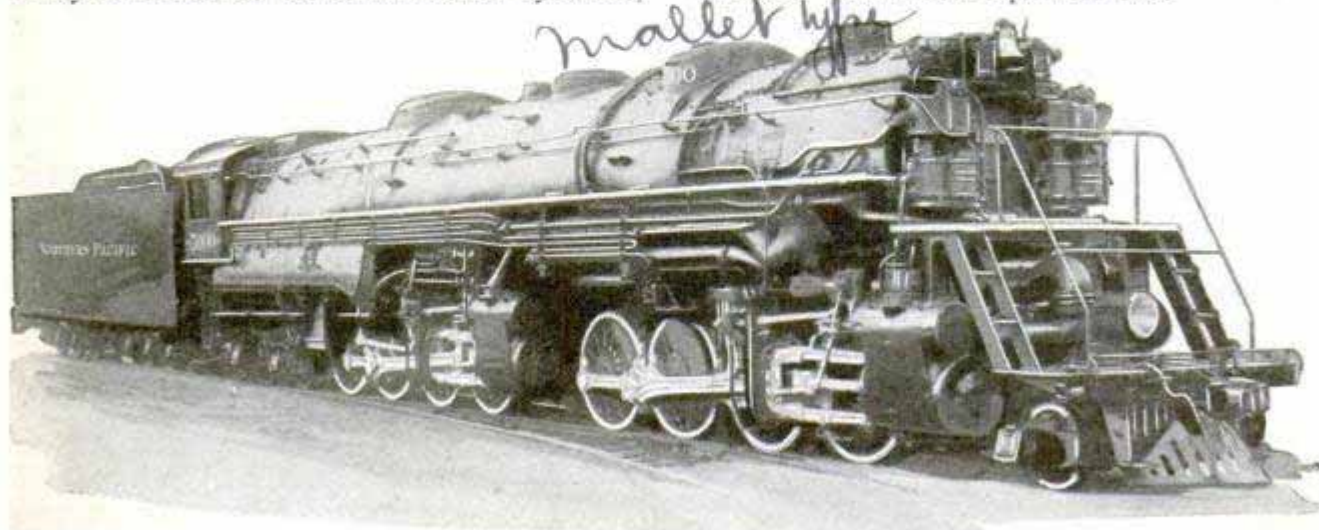
comparable to our galaxy in form and composition. There are hundreds of thousands of them, mostly too far away to be accurately measured, but apparently smaller than our system."

## AUTOMATIC BRAKE FOR AUTO PROMOTES SAFETY

2108 Brakes are applied automatically as soon as the foot is removed from the accelerator in a safety system a Swiss inventor has developed. The brake is on when the car is in neutral gear, but is released with the shift to first and operation of the accelerator. It is said to hold the car on hills without the use of the handbrake and is intended to be of great service in the event of danger ahead. Few drivers forget to take the foot from the accelerator in case of trouble, but not all know how to stop the car promptly after that.

## ENGINE HALF A BLOCK LONG HAS THIRTY-FOUR WHEELS

2084 Designed especially to burn a grade of coal of comparatively low heating value, a huge engine constructed for the Northern Pacific railway is 125 feet long, weighs more than 1,000,000 pounds and has thirty-four wheels, including the twelve on the tender. An interesting feature is the mechanical stoker which will crush, deliver, and distribute about the huge fire box, more than twenty-two tons of coal an hour. It is expected that the locomotive will be able to haul, in one train, cars that are now made up into two.



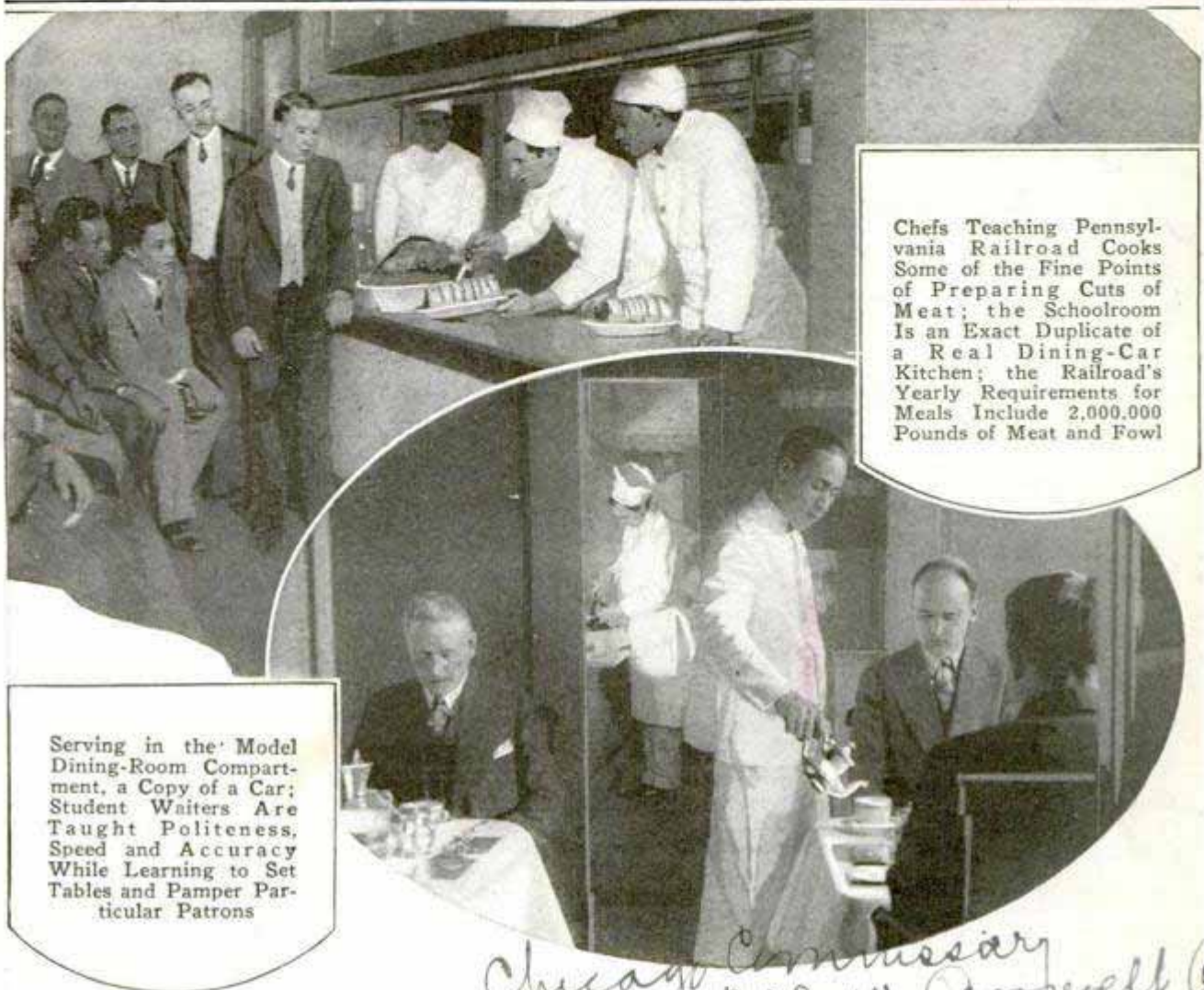
Powerful, Huge and Yet Easily Managed. This Locomotive for the Northern Pacific Railway Is Especially Interesting Because It Has Been Designed to Burn a Low Grade of Fuel

American Locomotive Co. made this

Badertscher  
Vakuumbremsen  
Aktiengesellschaft  
Los Angeles  
Bellevue  
Switzerland  
Zurich



## DINING CAR WITHOUT WHEELS SERVES AS SCHOOL



Chefs Teaching Pennsylvania Railroad Cooks Some of the Fine Points of Preparing Cuts of Meat; the Schoolroom Is an Exact Duplicate of a Real Dining-Car Kitchen; the Railroad's Yearly Requirements for Meals Include 2,000,000 Pounds of Meat and Fowl

Serving in the Model Dining-Room Compartment, a Copy of a Car; Student Waiters Are Taught Politeness, Speed and Accuracy While Learning to Set Tables and Pamper Particular Patrons

To train cooks and waiters under conditions resembling, as nearly as possible, those encountered on an actual run, the Pennsylvania railroad has built exact duplicates of dining cars in three commissary buildings and now maintains schools at New York, Columbus and Chicago. Every feature, from cooking utensils, range, broiler and pantry, to the dining room and table for patrons, has been reproduced precisely. Even the familiar aisles and corridors have been retained and made to conform exactly with the standard dining-car specifications. In fact, everything is almost exactly the same except that the stationary school does not move. But, officials declare, after waiters have been trained in a schoolroom of the same proportions as the place in which they are later to work, they have less difficulty in balancing trays and passing around corners, even when the car is crowded and the train is speeding around

a curve. The average dining-car employee spends about three hours at school each week while assigned to his regular run. At intervals, he is detailed to the school for a week or more of intensive training. Under a staff of specially trained instructors and supervisors, cooks learn how to prepare various cuts of meat, and poultry of all kinds; how to make sauces and dressings, and they become familiar with the special utensils used on a dining car and also become accustomed to working within the restricted space afforded in a dining-car kitchen. The schools have been established largely because of the railroad's extensive dining-car operations and the difficulty of giving instruction in an ordinary kitchen or schoolroom. The line now has 183 dining cars which serve an average of 12,000 meals daily, or approximately 4,000,000 a year, and are using 2,500 tablecloths and 15,000 napkins every day the year around.

*Chicago Commissary  
328 W. Roosevelt Road  
Chicago*

*Sunnyside Yard Long Island City*



St. Louis Auto Dealer's Salvage Yard  
 6600 West of the St. Louis Mo  
 210 4

4639 Montgomery Ave  
 Bethesda Md.

# Saving All but

Corner of a Graveyard for Motor Cars That Have Outlived Their Usefulness in St. Louis; No Car That Enters the Yard Leaves Again under Its Own Power

A NEW style of establishment for the efficient disposal of aged automobiles which menace public safety has been fostered by the organized motor-car merchants of St. Louis.

These dealers have banded together in a traffic-safety campaign to eliminate veteran cars with defective brakes, steering controls, and similar imperfections, from arterial highways and intersecting streets. Their co-operative undertaking plant is an efficient salvage station where all but the squeaks and rattles from old cars are reclaimed.

This salvage station is quite different in operation from the ordinary automotive junk yards. Its rigid rule is that every car purchased must be dismantled. The majority of the cars are delivered at the plant under their own power, but that trip is their touring swan song. Dilapidated automobiles are purchased by the thousand both from the dealer members of the association and from the general public. The prices paid range from \$2.50 to \$40, the average automobile being bought for \$20. The salvage is so complete and detailed that \$40 worth of accessories, repair

parts, equipment and raw manufacturing materials will be recovered from each machine and sold.

The plan not only accomplishes its primary purpose of ridding the congested streets of dangerous cars, but it brings this to pass at a profit. The salvage yard has fixed \$100 as the minimum price for used cars which the reputable dealers will handle. They hope to raise this limit to approximately \$200 during the next year. All cars of lower value are catalogued as unsafe, and are delivered to the salvage station as automotive "sacrifices."

The batteries, generators, starters and radiators are removed from the cars, inspected and tested. If found in good order, they are reconditioned and sold directly through the retail shop connected with the salvage plant under a ninety-day guarantee. These parts usually are in fine serviceable condition even though removed from worn-out machines, because they are replaced periodically and maintained better than the millrun of working parts in the old automobile.

In wrecking the cars, the windshields as well as the window glass in closed cars



# the Squeaks



One of the Powerful Electric Shears That Bite Ancient Automobiles into Small Pieces, Ready to Be Melted Down and Used Again; It Is Working on a Pile of Rims

are removed, sorted and graded as to size and model of auto which they will fit. The ordinary junk man rips all upholstery from the car and burns it. The St. Louis wrecking establishment reports attractive returns from the salvaging of moss, hair, cotton, burlap and leather from upholstery. This project pays the entire expenses of its acetylene-torch shop, where the motors are removed and the chassis dismembered.

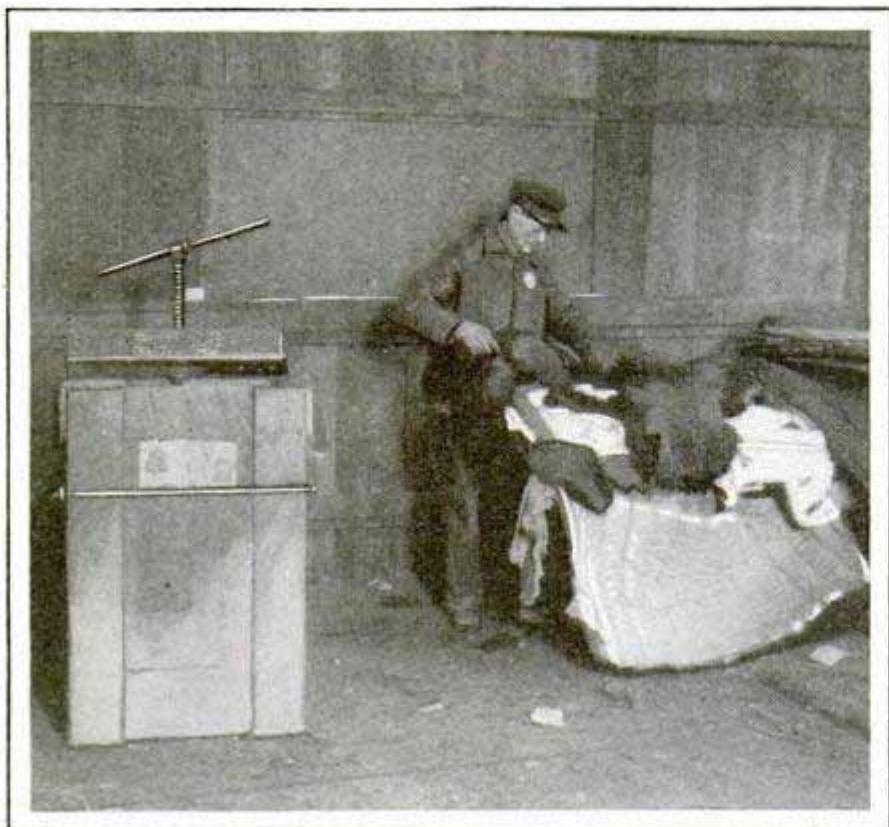
An electrified monorail system removes the motors from the torch shop and delivers them to the yard unit, where they are scrapped in order to recover the different metals they contain. Bronze, high-carbon steel, number-one melting steel, bearing metal, copper, aluminum and cast

iron, which are sold for from seven to twenty cents a pound, are reclaimed from the engines.

Some bodies are removed and sold intact for from \$25 to \$50 apiece, but the majority of bodies, fenders, steel tire rims, rear axles and other worn-out parts are chewed into smelter material, called "busheling," in the jaws of mighty electrified shears. When working at capacity, one of these shears will reduce fifty ordinary automobile bodies, fenders and other discarded equipment into metallic mince-meat in one day. This busheling sells for an average price of \$8 a ton.

The macerated material is allowed to accumulate in huge piles until some ten carloads of the junk are ready for ship-





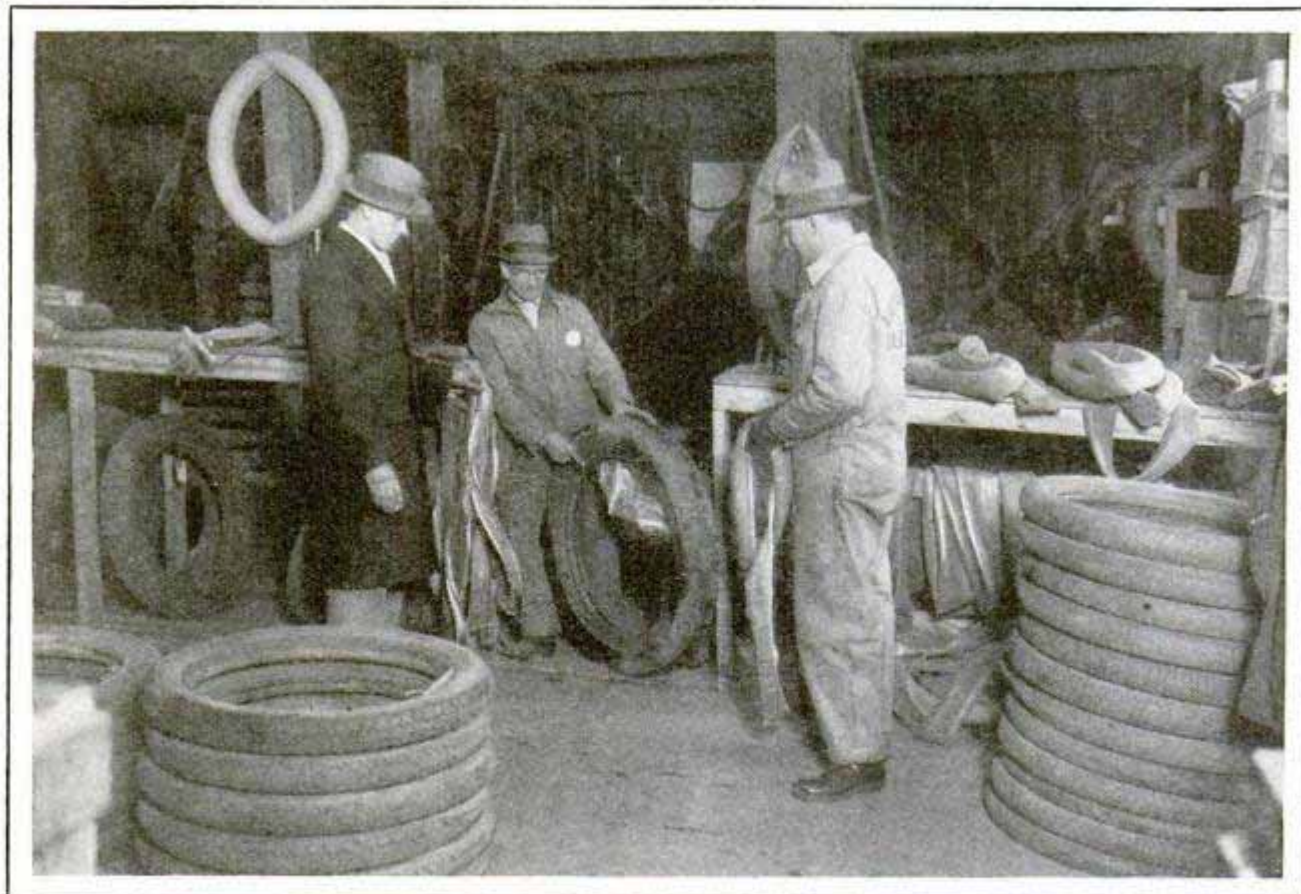
Hair, Cotton, Moss and Leather Are Salvaged from Upholstery, and the Profits Run the Acetylene-Torch Shop

cars. This magnet lifts 500 pounds of the material at a time and eliminates costly hand labor. The sorting and grading of salvage metals is so thorough that the steel mills pay premium prices for the metal mincemeat which is unloaded, also by magnet, directly from the cars into the furnaces. The automobiles which owners have sold to the salvage experts subsequently may come home again to roost in the form of new radiators, boilers, bathtubs or plumbing fixtures.

Building contractors buy old automobile springs by the ton from this St. Louis salvage enterprise. The springs subsequently serve as

ment to the smelter. A powerful electromagnet is used in loading the scrap on flat

ideal reinforcement for new concrete construction and are in keen demand for that

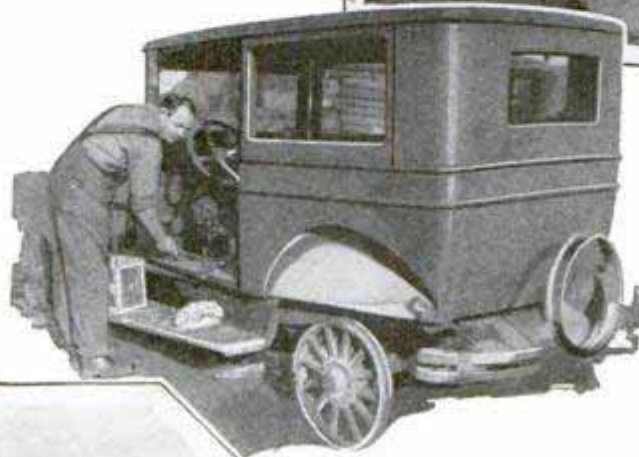


Tires, Batteries and Generators, Along with Other Kinds of Parts, Are Salvaged and Resold for Further Use; Thousands Are Put Back on the Roads Each Year



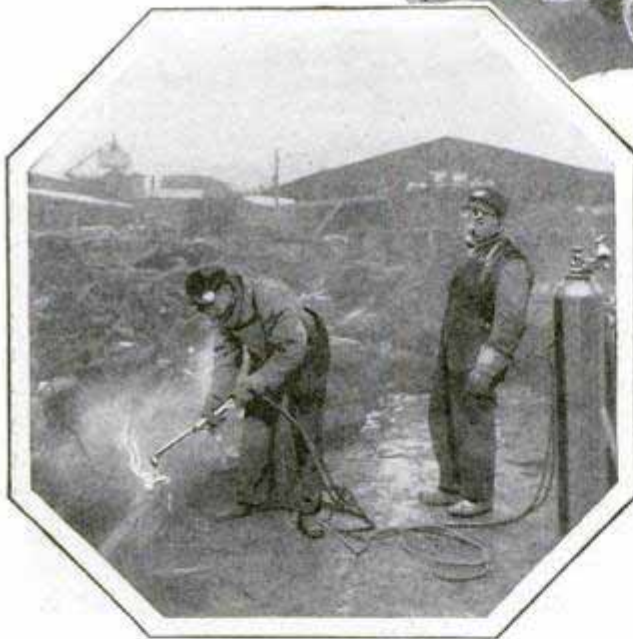
purpose at \$20 a ton. Everything else that is merchantable is also reclaimed and sold. Repair parts for practically all types and models of American and some foreign automobiles are obtainable at low prices at this hatchery of new automotive trade ideas.

Its originators hope to see this St. Louis scheme of co-operation in the salvaging of venerable and crippled motor cars flower into a national organization. This body, as visualized in motor-world day dreams, would be the country-wide core of chains of salvage stations which would speckle the



The menace of these roving automobiles — breeders of future tragedies — must be faced and then effaced from county, state and national highways. The St. Louis plan at least is a stepping stone toward

this goal until some better plan, if any, is devised.



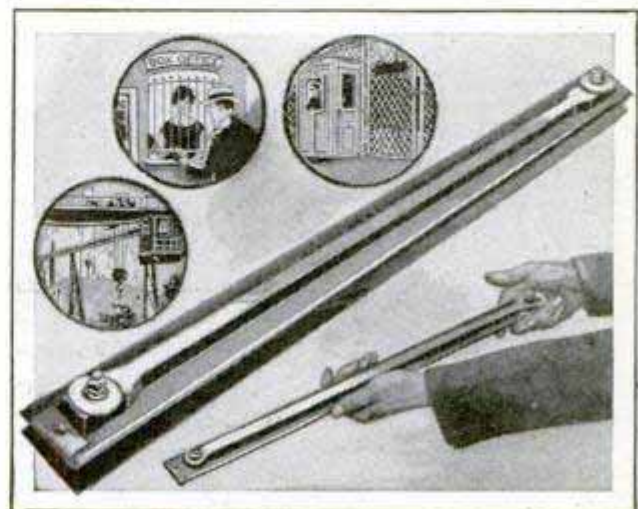
Closed Bodies, if in Good Condition, Are Resold at From \$25 to \$50 Each; Bottom, Portable Torches Cut Up the Scrap

American map. If every large city supported such a co-operative plant, it would not take long to exterminate unsafe motor cars from the traffic picture.

Such a project would also aid in standardizing and stabilizing used-car values and would force out of business the fly-by-night sandlot dealer who barter in "anything and everything that will run." Of the 25,000,000 automobiles now in use in the United States, at least one-sixth are possible "death cars" that are unsafe to operate in city-speed congested traffic or in open-country running, where many drivers travel at racing speed.

## ELECTRIC HEAT "BY THE FOOT" REPLACES STOVE

For warming small rooms and restricted spaces, an electric heater in the form of a slender bar, two feet long, has been introduced. It is thoroughly insulated, can be installed almost anywhere and operates with direct or alternating current. It is especially adapted for service in watchmen's houses, garages, vaults and show windows, and may be used singly, in pairs or in groups, as required.

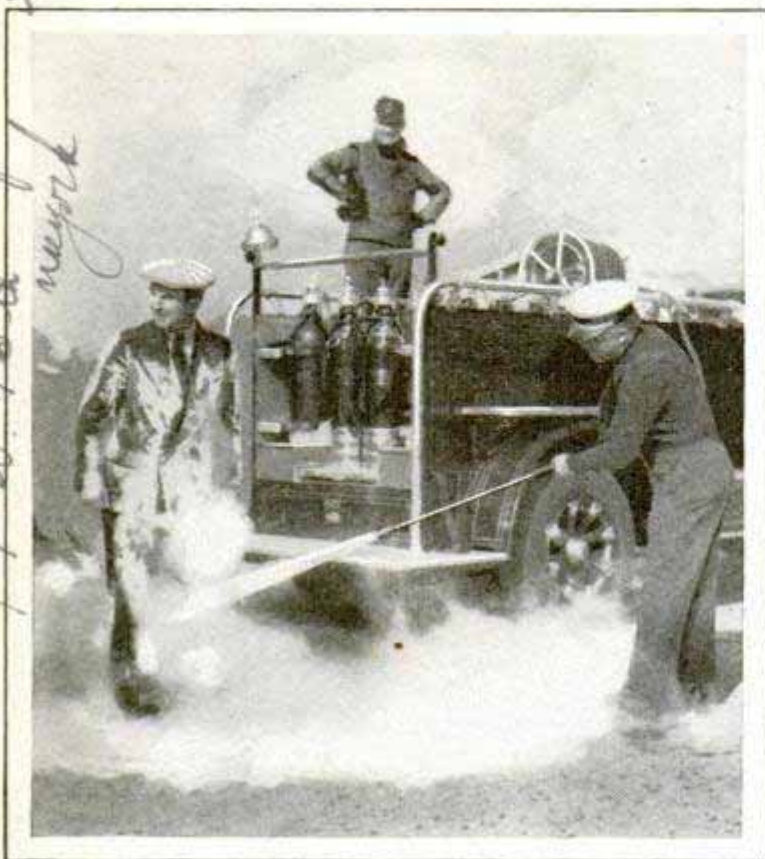


Electric Heater, and Illustrations of Uses

*The Cutler Hammer, Inc. Co.*

*Chicago. 323 N. Michigan*





### Spraying Man with Gas That Freezes Fires; It Causes No Damage to Fabrics When It Dries

Cml. R. E. Chute, Box 401, Route 4  
2/21 14200 ward, Calif  
Similar. Hypr. 2 reg Corps  
of rd 400

Improved apparatus has been developed by several fire departments for the use of carbon-dioxide gas in extinguishing blazes. This vapor freezes as soon as it is released from its containers and, by lowering the temperature of the surrounding area and cutting off the oxygen supply, is effective in putting out fires. When it melts, it entirely disappears without leaving a stain and is therefore especially suitable for use in quenching fires in stores and other places where the goods would be damaged by water.

## ALUMINUM MIXED WITH GOLD AIDS DENTAL WORK

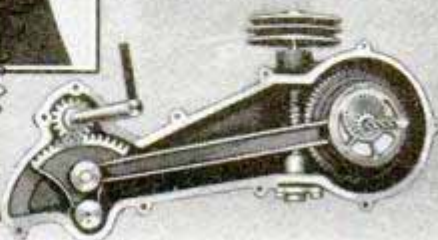
Aluminum is combined with other metals, according to reports of processes developed by a San Francisco inventor, to form valuable alloys. With gold, a hard, light alloy is prepared; a silver mixture so hard that it can be sharpened to a razorlike edge is also made, and copper is made suitable for use in tools. The gold alloy does not oxidize, it is said, making it especially useful in dentistry.

FILTERS SALVAGE COAL  
DUST FLOATING  
ON RIVER

\* Coal dust, floating on the river Ebbw, which flows into the Bristol channel in England, is to be reclaimed and used for heating purposes, by installing settling tanks and filters where the stream drains the land around the mines. Besides purifying the water, the plan is expected to make available considerable quantities of fuel at prices lower than the present scale for grades of corresponding quality.

## SPEED-SHIFT WASHER DOES BETTER WORK

One of the most interesting improvements in washing machines is an electrically operated outfit that has a speed-shift arrangement which requires no clutch or gear mechanism. Its speed is regulated simply by turning a small handle. The machine can thus be used more efficiently for washing different fabrics, some being cleansed better at low rather than high speed and not so likely to be torn. Furthermore, the speed shift prolongs the life of the washer and the absence of a clutch and other bothersome mechanisms is a great convenience to the housewife. The washer is the invention of an automobile engineer and is in line with similar improvements being developed for cars to eliminate gear shifts on them.



**Cross Section, Which Shows Gear-Change Plan, and, in Insert, the Control Handle**

simply by turning a small handle. The machine can thus be used more efficiently for washing different fabrics, some being cleansed better at low rather than high speed and not so likely to be torn. Furthermore, the speed shift prolongs the life of the washer and the absence of a clutch and other bothersome mechanisms is a great convenience to the housewife. The washer is the invention of an automobile engineer and is in line with similar improvements being developed for cars to eliminate gear shifts on them.

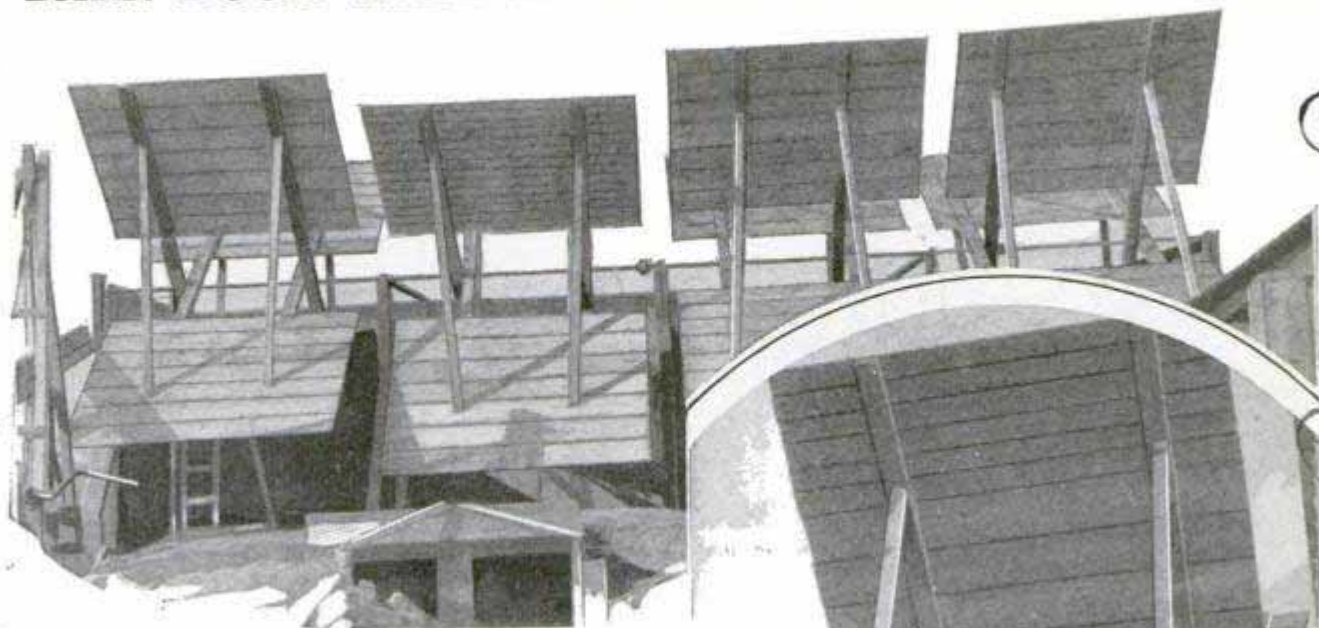
*Speed Corp.*  
*Select. A. Speed*  
*Stop & change speed*  
*30 W. W.*

Cross Section, Which Shows Gear-Change Plan, and, in Insert, the Control Handle

*Meadows Mfg Co*

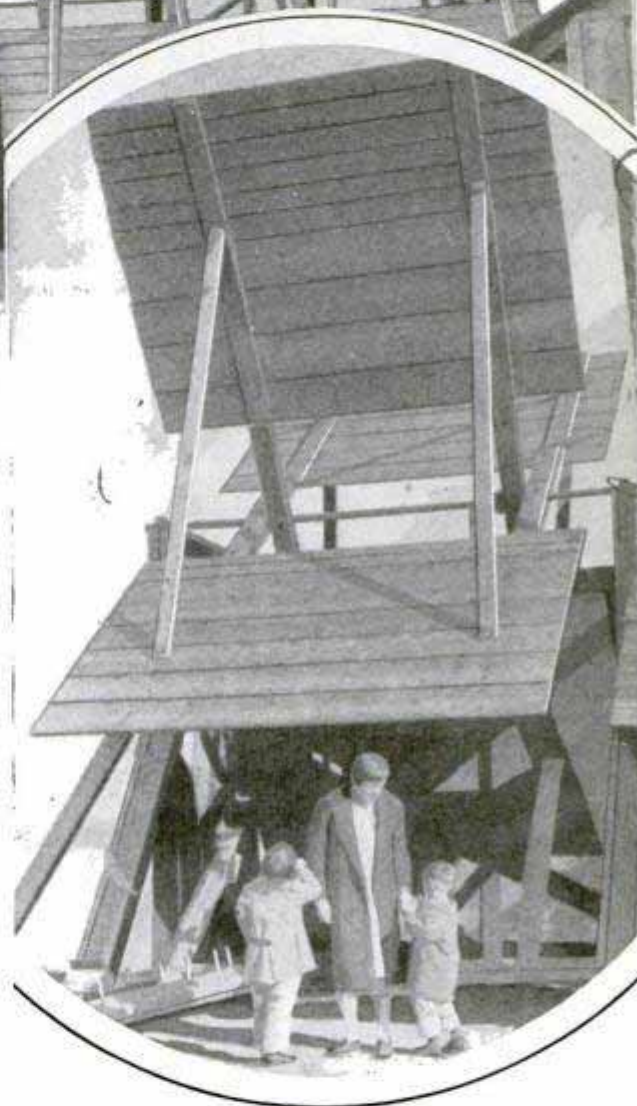


*Fresno Dec. Fresno, Calif.*  
**"BARN-DOOR" MILL HARNESSSES THE DESERT WINDS**



View of the Entire Mill, and One of the Blade Units, Showing Size and Arrangement

*H. O. Linsell.*  
 Travelers near Fresno, Calif., are sometimes startled to see what appears to be a number of barn doors flying through space. Closer examination shows that the rig is a sixteen-bladed windmill which a Dutch inventor has devised to run two pumps and a dynamo at the same time. Oddly enough, a barn door was the inspiration for the idea. The inventor once watched a ranch hand trying to close a barn door against the wind. The difficulty of the task prompted the plan of building a mill with large, flat blades like those of a paddle wheel. The idea was developed, the blades being arranged to turn a shaft which was geared to the pumps and the dynamos. An advantage of the scheme at this particular farm is that the mill is placed where no obstructions reduce the force of the wind so that a high tower is unnecessary. At the same time, the inventor has devised a way to decrease the resistance from the back stroke of the blades by erecting a wooden



wall which covers the lower part of the mill at the rear. Under favorable conditions, the rig is said to be the equivalent of a fifty-horsepower plant. A steady stream of water is afforded by the two pumps.

*B. Wood, Corv.*  
**RADIO RECORD ON DICTAPHONE SPEEDS NEWS REPORTS**

*2162*  
 Radio and the dictaphone have been linked in Oregon to speed the distribution of stock-market reports. The radio voice is recorded directly on dictaphone cylinders from which a stenographer pre-

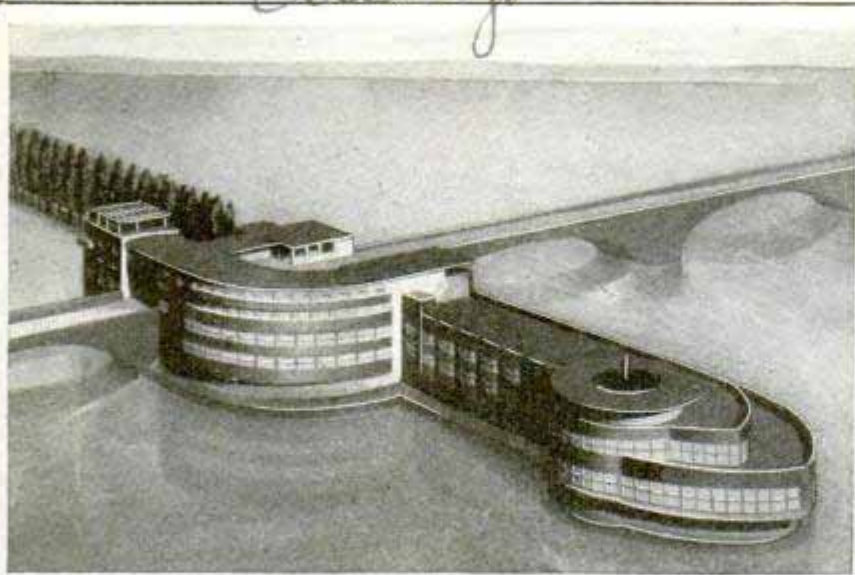
pares copy for the newspaper presses. The experiment was successfully performed under the direction of the state agricultural college to insure the speedier distribution of market reports throughout the rural districts, and adaptations are contemplated to make possible the continuous recording of similar broadcasts.

*Corvallis, Oregon.*  
*Cont. John C. ...*

*H. O. Linsell, Rural Route, Fresno, Calif.*  
*College News Service*



Oil 0.50  
1/19/27  
Waste



Model of Proposed Hotel for Lake Resort; the Boatlike Plan Permits Wide Promenades and a Good View

## BIG HOTEL IN FORM OF BOAT FEATURES LAKE RESORT

Modern ideas predominate in a hotel a German architect has designed for erection in one of the lakes near Dortmund. It is to be built in the form of a boat and has wide promenades like inclosed decks, a coffee terrace, dance pavilions and large dining rooms overlooking the water, besides the usual hotel rooms. A special feature is to be the illumination both inside and out. At night, rays from thousands of electric lights will make the hotel visible from great distances. A fine view is enjoyed from most windows.

## SLIDING-BEAM COMPASSES PROMOTE ACCURACY

Designed to eliminate the faults most frequently found in ordinary compasses, a new instrument is made in the form of beam compasses, but small and light enough to be used with one hand. It is claimed that the point of these compasses will not slip and tear the paper, and the



adjustments are such that no small errors can occur in setting or in frequent use. The instrument will draw circles up to eight inches in diameter.

## SAFETY THROTTLE FOR AUTOS HELPS SAVE GAS

Greater safety in driving, economy in gasoline, and convenience are some of the advantages claimed for an accelerator-control throttle attached to the gear-shift lever. It permits shifting from one speed to another



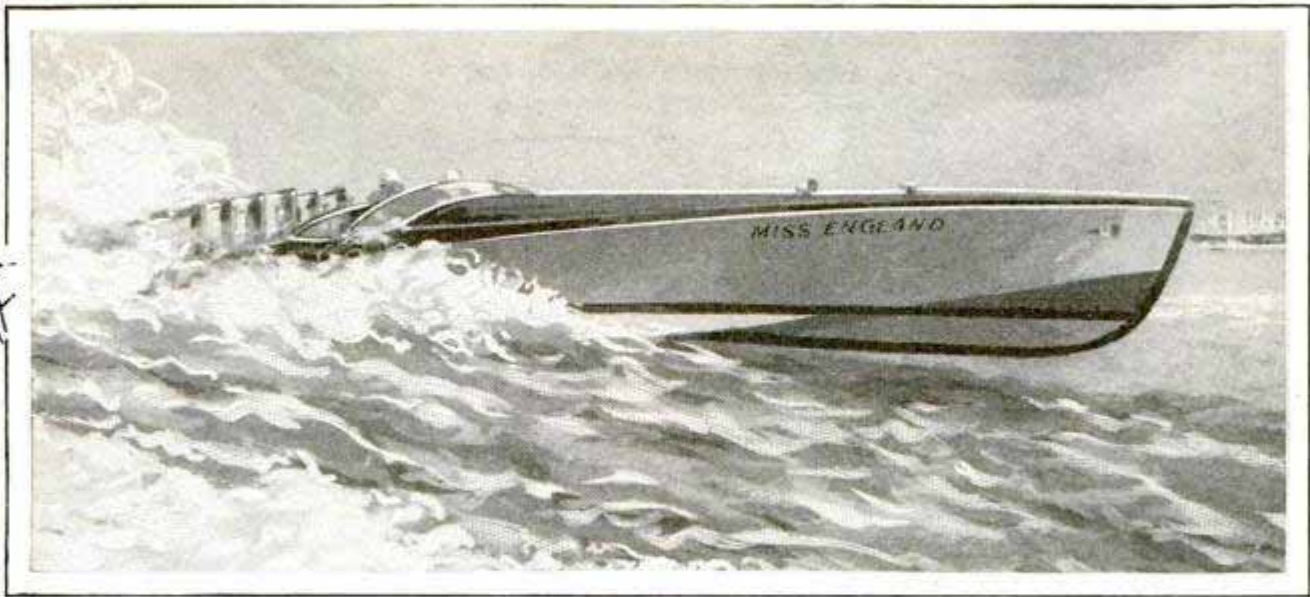
without removing the foot from the brake pedal, prevents killing the motor and provides the "extra arm" so often needed while driving in crowded traffic. The device is attached in a few moments, and no alterations in the car are required. It provides an easy way of operating the accelerator by hand instead of by foot control and at the exact time when more gas is needed.

The Esterbrook Steel Pen Mfg. Co.

1121 Post Bldg. 3rd fl.  
General Automotive Devices Co.  
Boys 316  
Boys 311  
Boys 311  
Boys 311



2140 British Overboard Boat is  
Hyde, Kent, England.



With the Engine Placed behind the Driver and His Mechanician, the New English Speed Boat, Which Is Coming to America to Race, Presents an Unusual Departure in Design

### ENGINE IN EXTREME STERN OF NEW SPEED BOAT

A twenty-six-foot hydroplane, powered with a 900-horsepower 12-cylinder Napier airplane engine, is being brought to America by Maj. H. O. D. Segrave, the famous racing-car driver, to attempt to lift the world's speed record on the water. He is bringing his new racing car, the "Golden Arrow," to attempt the same feat on land. The unusual feature of the boat is that the engine has been placed in the extreme stern, with the pilot and mechanic in front of it, reversing the usual arrangement. The position of the engine is expected to increase the planing action of the one-step hydroplane hull at high speeds. The engine is similar to that in his racing car, and is the same type that was used to win the Schneider cup from Italian flyers last year at Venice. Reports from England rate the boat at over eighty miles per hour, but this speed will have to be exceeded to better the record set at Detroit last September, when Gar Wood's "Miss America VII" averaged 92.834 miles per hour in six one-mile dashes.

### ALL UNDER THREE FEET RIDE FREE IN BUSES

Height, not age, is to be the determining fare factor on an eastern motor-bus line. All persons thirty-six inches tall or less, will be carried free. Those taller

will pay the fare regardless of their age. To prevent disputes, a height gauge has been installed on the doors of the vehicles. Children whose heads overtop the mark must pay.

### LOUD SPEAKER FOR TELEPHONE LEAVES HANDS FREE

To amplify the voice from the telephone, a loud-speaker attachment has been devised so that the listener does not have to hold the receiver. An arrangement is also provided whereby the hookup may



Telephone Conversation Being Amplified through the Loud Speaker Attached to Receiver

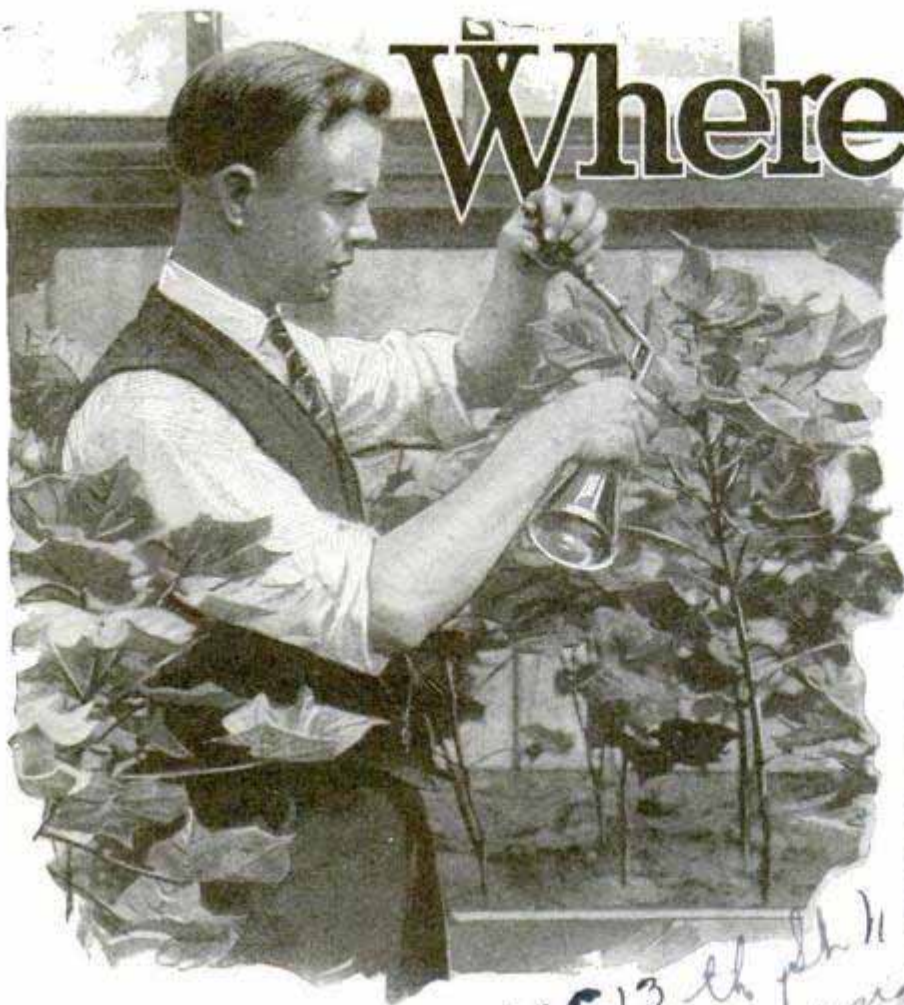
be connected with a radio combination on the telephone instrument.

Public Service, Carson.

2115  
Mr. H. O. D. Segrave, Chicago  
S. Clinton



1938



# Where Men

bottom of ships, but the barnacle itself is but one of a number of such organisms, although the principal one. These growths accumulate rapidly on the hulls, sometimes projecting many inches. Only a fraction of an inch is necessary, however, to impede materially the ship's progress. Increased

By C. MORAN,

3825-13 the ph 11 0  
at 12 e hington 20 2

**M**EN who eat corn mixed with liquid titanium tetrachloride, a chemical used to make military smoke screens; who subject themselves to the deadly carbon monoxide of automobile exhausts; who handle chemicals, a single drop of which eats flesh to the bone, are experimenting at Edgewood arsenal, Md., in the production of ~~new war~~ gases and chemicals and in the utilization of these elements in industry.

Recent research at this laboratory has shown that the useful life of rubber may be prolonged by treating it with certain anti-oxidants; that the minute, natural "one-man tanks" of the seas—the marine borers—which have sent to the bottom more wooden ships than all the guns of war, can be halted by Lewisite, a deadly warfare chemical.

A toxic paint has been developed to prevent the formation of barnacles on the hulls of ships, which cause an annual loss of \$75,000,000 in fuel alone. Barnacle is the term commonly used for all marine organisms which attach themselves to the



Testing Poison Gas on Plants at Edgewood Arsenal, and Field Truck Used to Measure Gas Content of Air; It Is a Complete and Compact Gas Laboratory and Does Away with the Chance of Errors



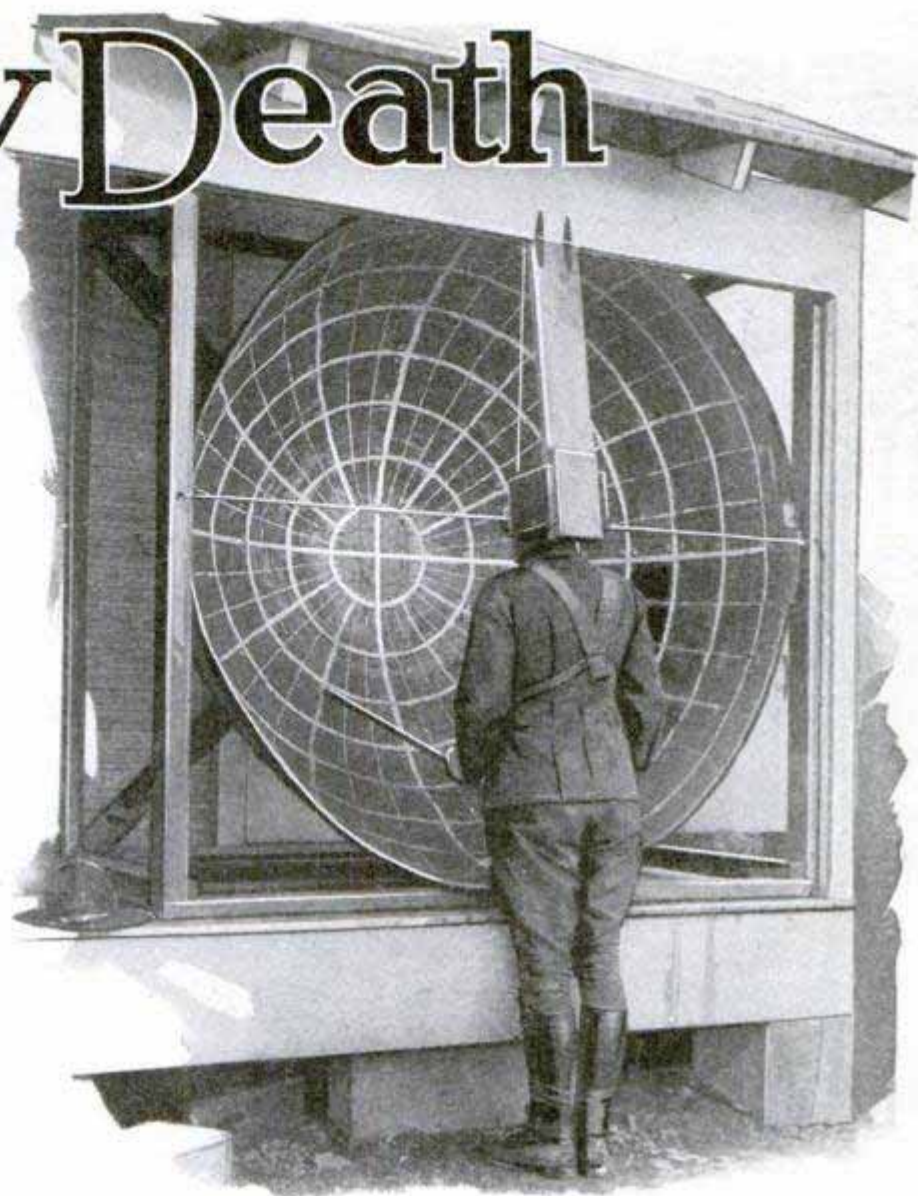
# Defy Death

fuel consumption of a vessel handicapped by barnacle growth sometimes amounts to twenty-five per cent.

Every vessel must be drydocked periodically for barnacle cleaning, the frequency of such cleaning depending upon the service of the vessel as to seasons and latitudes. The marine growth is active during the entire year in the tropics and only during the summer in the temperate zones. The paint devised by the war chemists is being used on destroyers in final tests to determine the relative life and cost of hot plastic paints and cold varnish paints.

The erroneous idea seems to be quite prevalent, say these chemists, that all chemical agents of warfare are toxic. In a recent demonstration, a smoke curtain was dropped from an airplane which was passing over a cornfield. Some of the liquid titanium tetrachloride fell on the leaves and ears of corn which subsequently became discolored. The farmer claimed that his crop had been damaged and demanded reparation.

A number of the more discolored ears were sent to the arsenal for test, and it was disclosed that neither liquid titanium tetrachloride itself, nor the products formed when it produces smoke—hydrochloric acid and titanium oxide—are harmful to eat. The discolored ears were eaten without producing any bad effect and the same was true with grains of corn mixed with a small quantity of titanium tetrachloride. All the discolored corn



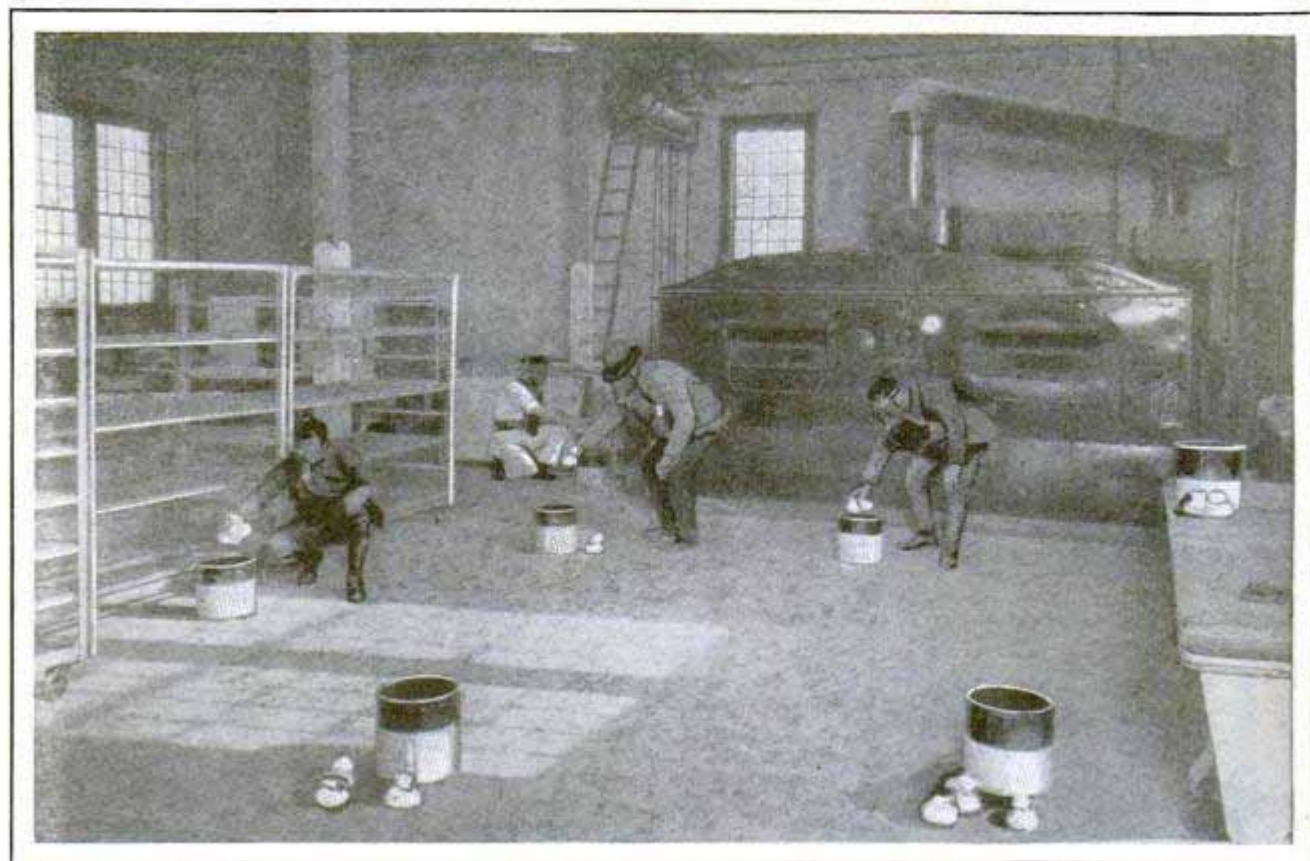
Not a Spiderweb but a Hemispherical Vision Chart, Used to Measure Angle of Vision of Various Gas Masks

was purchased and fed without injurious results to the live stock at the army post adjoining the cornfield.

The pestilence of certain species of birds which are harmful to agriculture or which deface buildings has long been the subject of investigation by the biological survey. Recent experiments have been made in endeavoring to exterminate these species by the use of chemical gases, but curiously enough the birds emerged from the gases unhurt. It was found that birds have rather marked resistance to toxic gases, and furthermore, that it is difficult to build up, out of doors, sufficiently high concentrations of these gases to be effective over extended areas.

During the war it was noted that pigeons almost always returned to their cages safely when liberated in a gas cloud. This





Fumigating a Bakery Badly Infested with Flour Weevils; Deadly Poisons, in Bags, Are Dropped into Jars Containing Another Poison to Create the Clouds of Lethal Gas

was quite a mystery until it was realized that the pigeons escaped by rising quickly above the gas. The tests showed that crows attempt to fly out of the gas cloud in the same way as soon as its irritating effects are felt.

Methods of extending the life of rubber many times its normal life have been developed as a result of experimentation to prevent the rapid deterioration of the hose tube, facepiece and exhalation valve of gas masks. Such deterioration made difficult the problem of maintaining a war reserve of gas masks. Initial tests revealed that methods of curing rubber had an important effect upon its life. Under-cured stock, lacking sufficient sulphur, becomes soft and even sticky with age, while overcured and bloom stock, containing an excess of sulphur, becomes brittle and cracks. As a result of the tests, faulty cure has been corrected and facepieces are now molded individually. This has developed an increase of the useful life under normal storage conditions from a few years to approximately thirty-five years.

Another improvement in rubber has been developed with anti-oxidants. These chemicals, when incorporated in rubber compounds, materially reduce or retard

rubber deterioration due to oxidation. Tests indicate improvement that may prolong the useful life of rubber to sixty years. For protection against sunlight, a compound has been developed of rubber, pigments, dyes, and softeners dissolved or dispersed in a suitable solvent. Methods of storing gas masks in inert atmosphere, such as nitrogen, also have been devised.

The marine borers have been halted by Lewisite in the hands of the government chemists. Indications are that battles, started long before the sinking of the Spanish Armada, now have been brought to an end by the application of a derivative of Lewisite in the path of the disastrous marine borers, such as the teredo, bankia, martessa and limnoria.

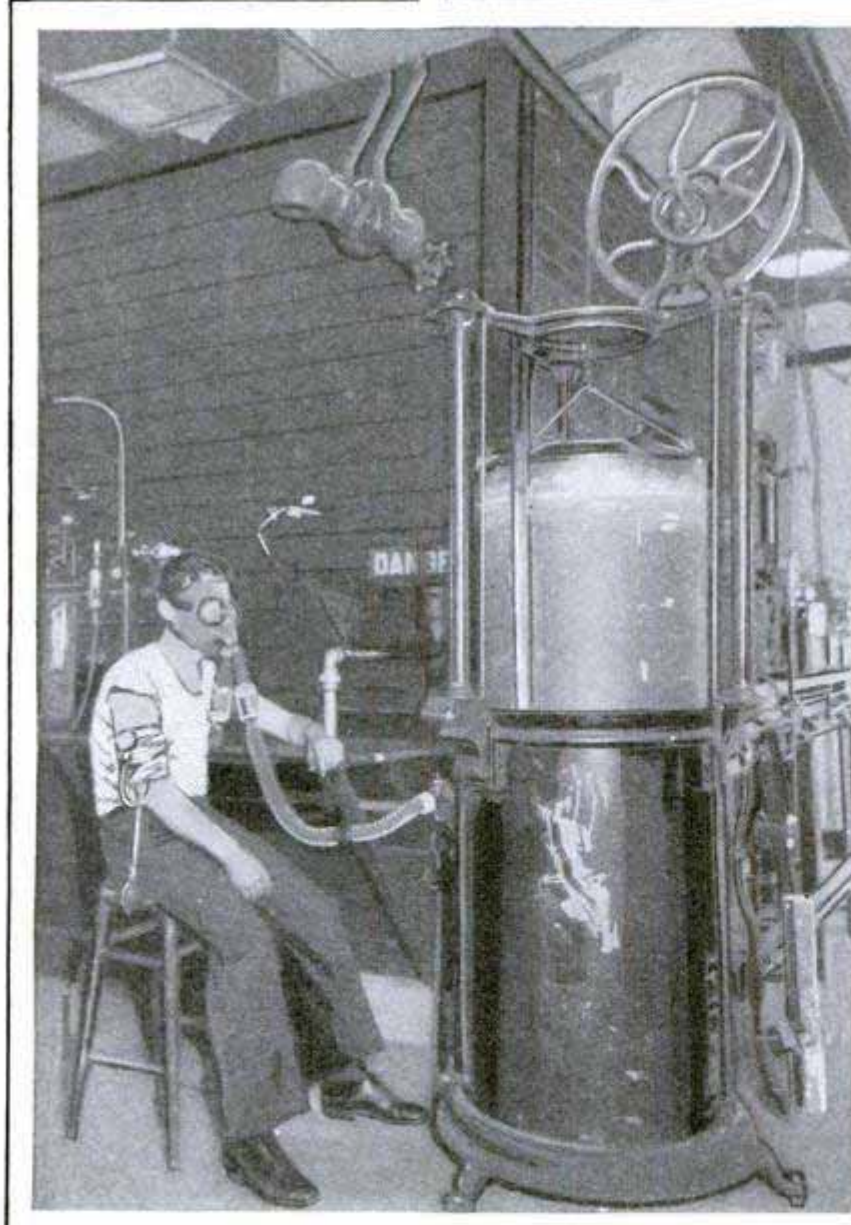
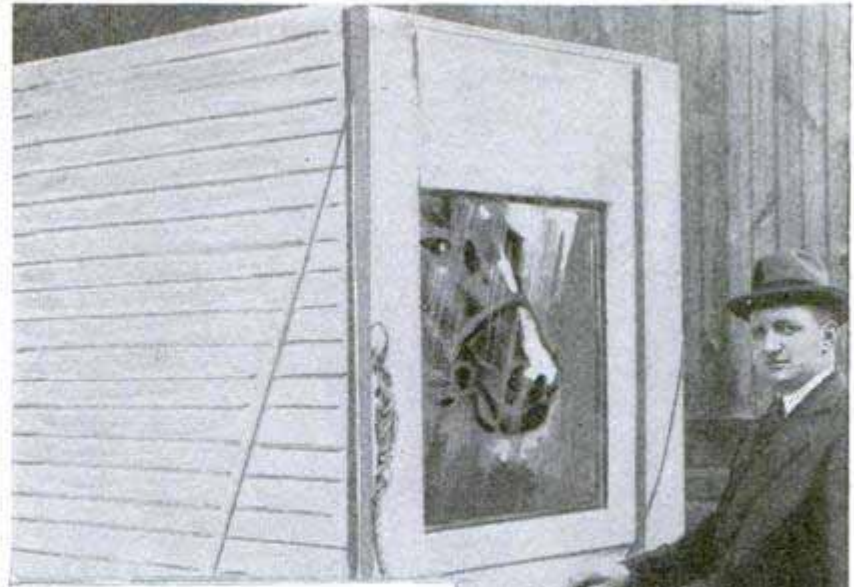
These mollusca and crustacea have been recorded in history as being responsible for the sinking of many ships of the Spanish Armada and of boring to weakness the timbers of the dykes of Holland, and they have caused millions of dollars of damage to the wharves of the world by eating the wooden piling.

Creosote long has been applied as a temporary barrier to these pests, but for many years the war-department chemists

*Coal tar*



have been experimenting upon a more permanent defense. Tests have been completed to show that organic compounds of arsenic, mercury and copper have been of the greatest general toxic value against the marine borers. Of the arsenicals tested, those which were either chemical agents of warfare or derivatives of these chemicals were most effective. A derivative of Lewisite—chlorvinylarsenious oxide—



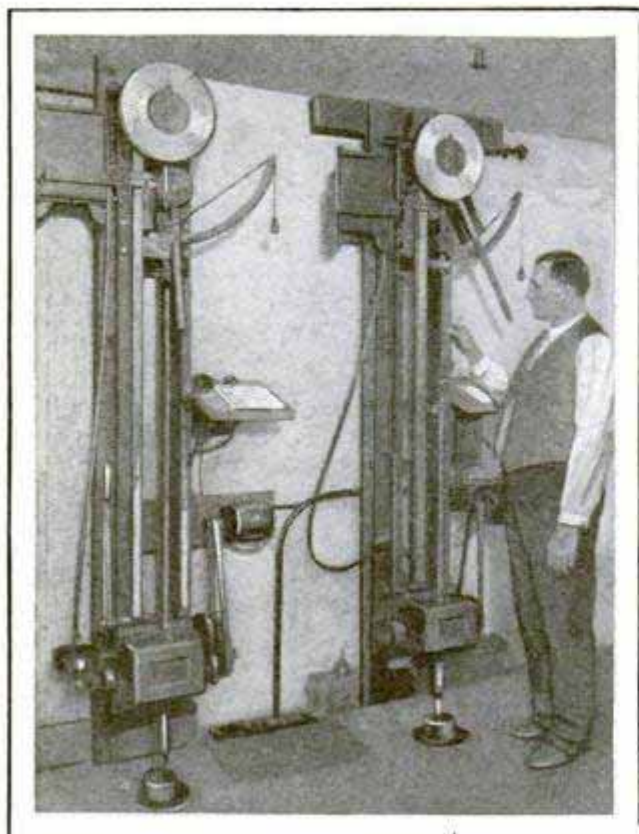
has the highest toxic value.

Solutions of the following compounds in creosote have stopped the borers from passing into the treated portions of test piling after they had riddled bait strips attached to the piling: copper orthonitrobenzoate, mercury benzoate, mercury resinate, mercury stearstendiphenylamine-chlorarsine. Straight creosote impregnations did not stop the borers.

Following a recent explosion in an Alabama coal mine, eight men

Apparatus Used to Test War Gases on Human Beings, and, Above, One of the Side-Line Developments; Treating a Race Horse with Chlorine as a Cold Cure; the Gas Treatment Is One of the Accidental Discoveries of War Days Which Has Proved Successful in Peace

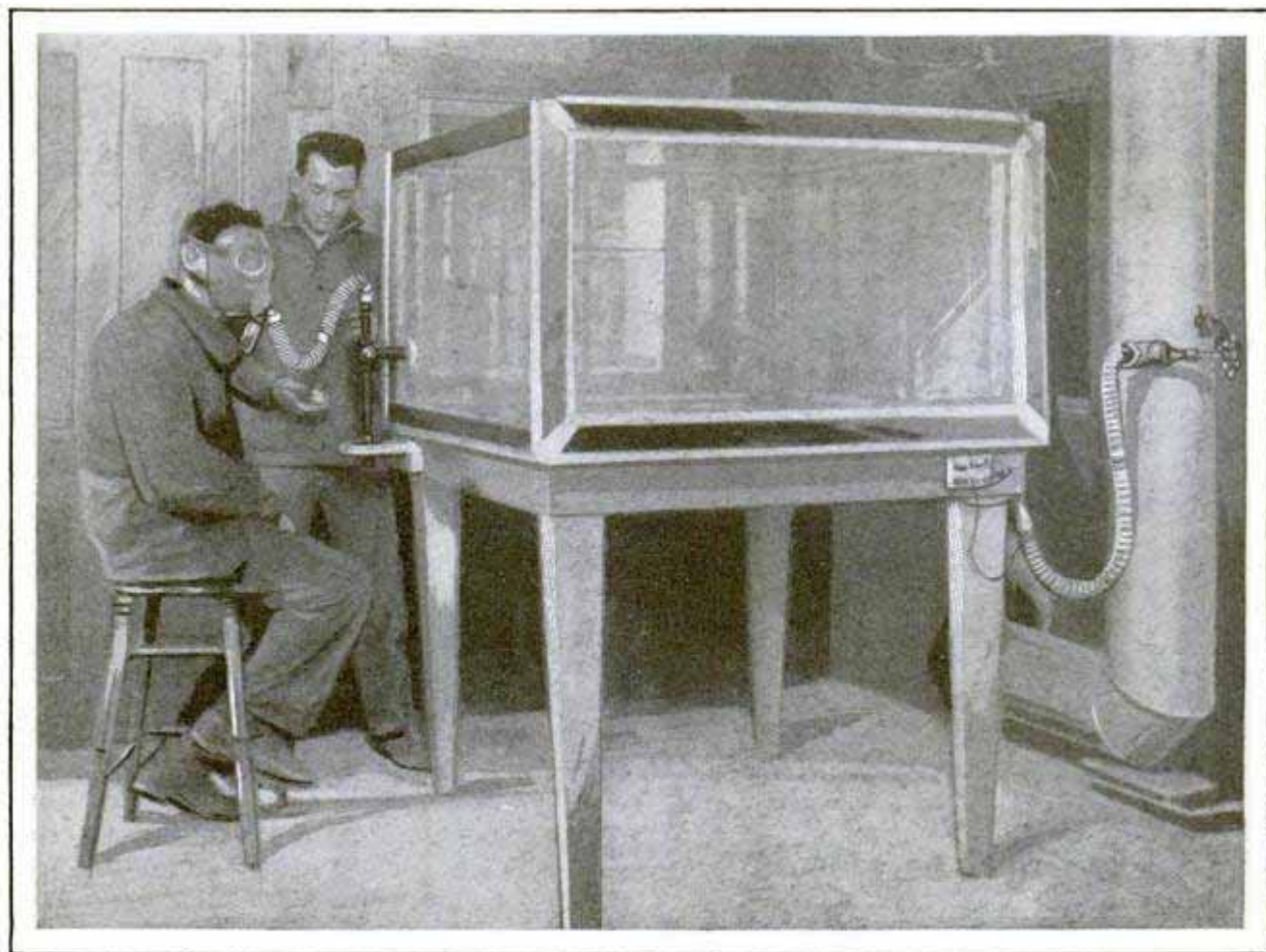




Testing the Tensile Strength of Rubber Treated with Chemicals That Prolong Its Life to Sixty Years

were trapped in the fifth right heading, their only means of escape blocked by afterdamp, the gaseous products of the explosion containing the deadly carbon monoxide. Two of the men who tried to make their way through were overcome by the gas and died. The others waited for help and, when equipped with self-rescuers, the chemical filling of which is a product of chemical-warfare research, made their way through the firedamp unharmed.

The self-rescuer is a commercial pocket-size respirator consisting of a canister which is fitted with a mouthpiece, nose clip and exhalation valve. The chemical filling of the canister, which eliminates carbon monoxide from the air breathed, is a mixture of metallic oxides, known as "hopcalite." Hopcalite is employed not only in the miners' self-rescuer, but also in gas masks for firemen and other workmen who may encounter dangerous concentrations of carbon monoxide. It is also used in carbon-monoxide recorders and alarm devices, such as in the recently



In Developing Commercial Uses for New Chemical Mixtures, the Army Gas School Uses This Tank Apparatus to Test the Effects of the Gases on the Human Constitution

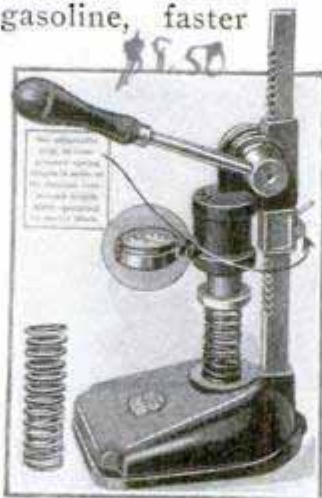


constructed underwater Holland tunnel between New York and New Jersey.

Prior to the discovery of hopcalite, there was no type of gas mask which would provide protection against carbon monoxide, other than the oxygen inhalator, a cumbersome type of equipment which is a self-contained mask with its own supply of oxygen. It was discovered, ultimately, that a specially prepared granular mixture of the oxides of copper and manganese will change carbon monoxide when mixed with oxygen of the air, to carbon dioxide, a relatively harmless gas. This mixture of metallic oxides is called "hopcalite" in honor of the two universities, Johns Hopkins and California, where the basic principles were evolved.

### 208/ AUTO VALVE-SPRING TESTER HELPS SAVE GASOLINE

Balanced springs insure better performance of the automobile motor with consequent saving in gasoline, faster pick-up and other advantages. To detect weak and faulty springs, a simple tester has been introduced. It is arranged so that the springs can be tried while in the block or when removed, and operates accurately. The entire test can be made in a few moments. The state of the springs is determined by a gauge.



It takes about two years for a baby whale to grow to an adult.



Composite Drawing of Proposed Traffic Plan in Paris, Where Double-Decked Streets and Cross-Overs Are under Consideration

### TWO-LEVEL STREETS PLANNED TO SPEED PARIS TRAFFIC

One of the plans under consideration for relieving the traffic situation in Paris involves the building of two-level streets. An elevated pavement would be provided for pedestrians only, and the stores would have entrances and show windows on this level. Bridges would be constructed at street crossings. The level for vehicles would have space for parking cars and stairways would be provided at convenient locations. A feature of the plan is the concealed tubular lamps which would eliminate need of electric-light standards.

### TWO MILLION PENNIES A WEEK USED BY BIG STORE

2125 Pennies at the rate of seven tons a week were used by a large New York department store during the holiday season. One reason for the huge demand was the fact that most of the merchandise was priced at odd figures, and as the store's business is done on a cash basis only, pennies were needed for practically every transaction to make the proper change.

Stevens U'aldin R H Macy & Co. chuc.



604 Grand Ave. Temple  
Kansas City, Mo.



Demonstrating the Table Basketball Game; the Ball Is Sent into Baskets by Striking Projecting Sticks

## BASKETBALL PLAYED ON TABLE LATEST PARLOR GAME

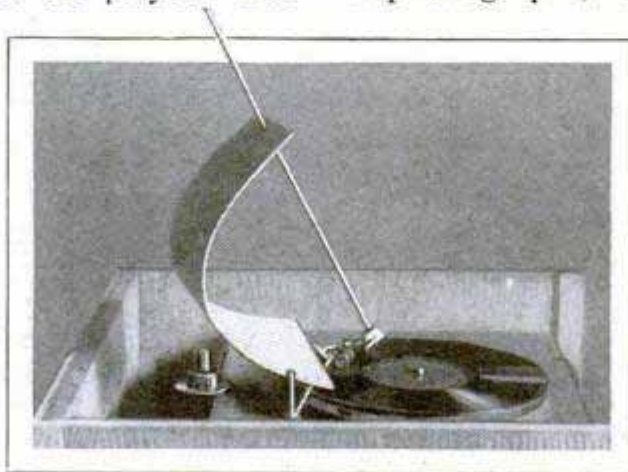
Table basketball, a game devised by a student at the Kansas agricultural college, has appeared in the form of a simple outfit that will amuse the players as well as spectators, and also test the skill. It consists of a metal box, the top of which is a cardboard field, depressed in the center to permit the ball to roll into any one of a number of holes along this part of the field. At either end is a small woven basket on an upright. By striking down on the end of small sticks or levers that extend under the field to the holes and project a short distance at the sides, the ball is thrown up out of the hole and, if properly propelled, falls into a basket, scoring two points for the player. The sticks on one side reach only certain holes and those on the other reach the rest, so that opposing players can "shoot." If the ball is struck off the field, a foul is counted and the other player enjoys a "free throw," a chance to shoot for a basket just as in the real game.

## INSECTS AS LEPROSY CARRIERS STUDIED BY DOCTORS

Studies are being conducted by the army research board at Manila to discover if insects may not be carriers of leprosy. The investigation was started several months ago and, although but one case of transmission of the disease by a mosquito has been definitely recorded, the experiments are still under way. The insects are allowed to visit leprosy patients and then to bite volunteer subjects, men who, with the permission of the late governor-general, have been selected from among prisoners serving long terms. After more than sixteen months, none of the volunteers has been affected, but this is not long enough for final decision in the matter, and it is pointed out that none of the subjects may be susceptible to the disease. The cause of the spread of the malady is still a mystery. Married couples, one of whom has leprosy, have lived together for years without the other one acquiring the disease. Climate and density of population have been thought to have some connection, but they alone cannot be the reason for the spread of leprosy, studies have shown. Insects do not always acquire the germs after feeding on leprosy patients and, in the rare instances when they do, they do not always immediately bite a well person, but doctors still believe that mosquitoes, flies, fleas and other insects may be at least partly to blame.

## CARDBOARD MAKES SOUND BOX FOR PHONOGRAPH

As a substitute for the usual sound box on phonographs, a Swedish inventor has de-



Bent Cardboard, Which Is Said to Give Results as Good as Those of the Usual Phonograph Tonearm

vised a way to make ordinary cardboard amplify the tones reproduced by the needle. The cardboard is simply bent and mounted as indicated in the accompanying illustration and attached to the needle by a special mechanism. The invention has been patented.



## WHALING HAS CHANGED SINCE MOBY DICK'S DAY



Modern Whaling off California Coast Little Resembles the Work That Made Bedford Famous; Whales Are Hunted by Fast Motor Tugs, Shot with Four-Prong Harpoons That Pass Entirely through the Body, When the Prongs Spread to Hold It Fast, and Then Buoyed and Left Until Several Are Killed and All Are Towed Ashore and Cut Up on Land

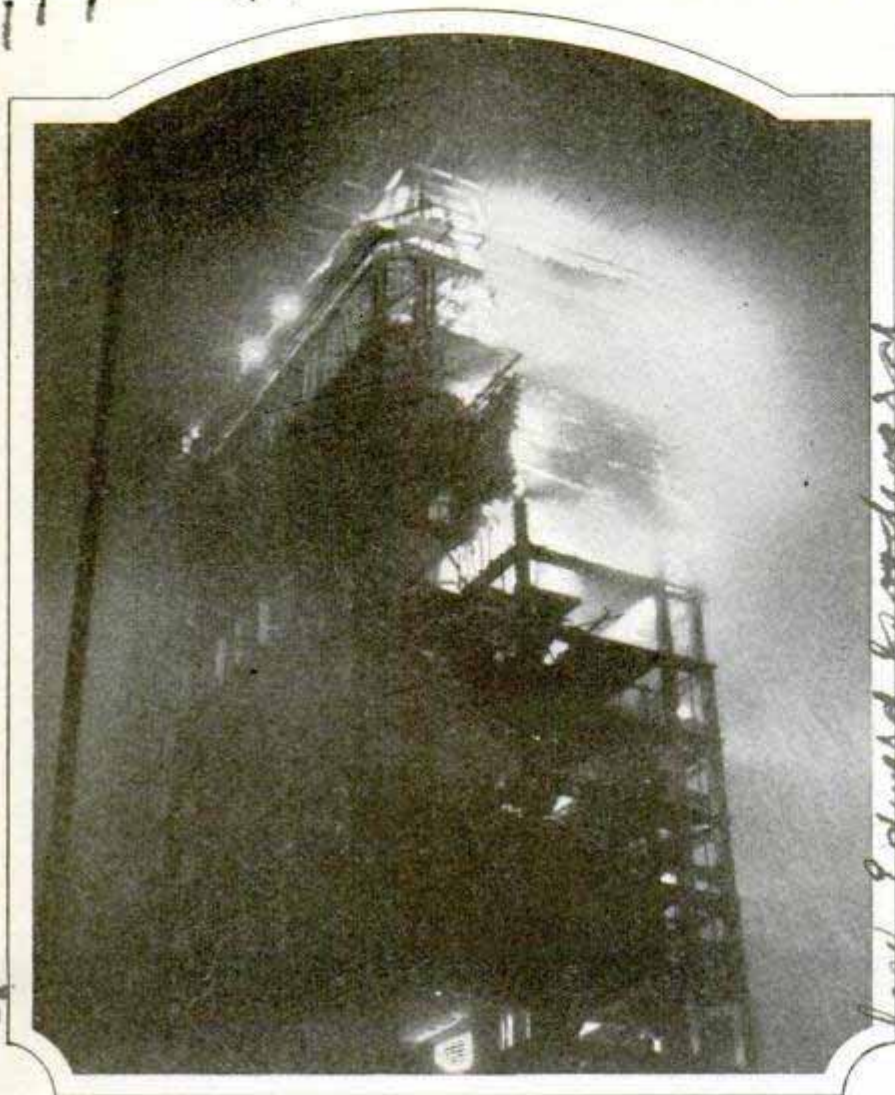


Parnassus and Third Cities San Francisco Calif.

Cont. Mr. Jesse L. Carr, University of California, University Hospital



2117



The Fire at Its Height, Burning in the Upper Stories of Uncompleted Chicago Skyscraper on a Winter Night

## FIRE HUNDREDS OF FEET IN AIR TESTS FIGHTERS' SKILL

Scaffolding, and other wooden parts in a skyscraper under construction in Chicago, caught fire forty stories above the street when the temperature was nine degrees below zero, giving firemen a busy hour before the flames were extinguished. Hose had to be hauled up by hand, while ice and wind added to the difficulties.

## RED INK STAINS ON MARBLE REMOVED WITH LIME

When vandals disfigured the Ypsilanti monument at Ypsilanti, Mich., with red ink, city officials were perplexed as to how to remove the stains. A paste was prepared, chiefly of chlorinated lime, and spread over the statue. After it was dry it was removed with a trowel and a fresh coating applied. Each succeeding appli-

cation removed some of the stain until it had been nearly obliterated. A shed was built over the monument during the process to permit warming the chemicals.

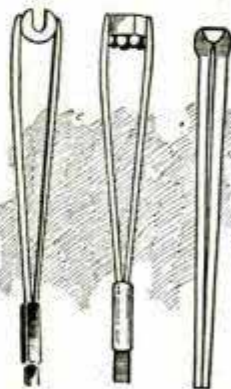
## FUEL OIL REPLACES GASOLINE IN BUSSES

Successful use of a heavy fuel oil instead of gasoline to run motor busses is reported by an eastern company. This has been made possible by equipping the engine with a special unit, the invention of a New Zealander, consisting of an aluminum pot in which is a nest of thin, curving plates, radiating from a central core. This device is said to help convert the oil into a dry gas before it is passed into the intake manifold. Substitution of fuel oil for gasoline is being watched by engineers who point out

that it would mean an annual saving of not less than \$50,000,000 simply in the operation of motor busses.

## LONG PLIERS FOR MANY USES AID IN SHOP AND HOME

Adapted for picking up almost anything from a thread in weight to ten pounds, specially constructed pliers have many uses around automobiles, in the shop or home. The tools weigh but two ounces and are thirteen or seventeen inches long. Putting in valve locks, removing corks from bottles and fastening or removing nuts, etc., are a few typical uses.



Plumb Tool Co.

Carl Cyril M. Lamb, 309 Ballard St. Ypsilanti, Mich.

How Edward Howard

Chicago, 639 W. Washington

Los Angeles, Calif.



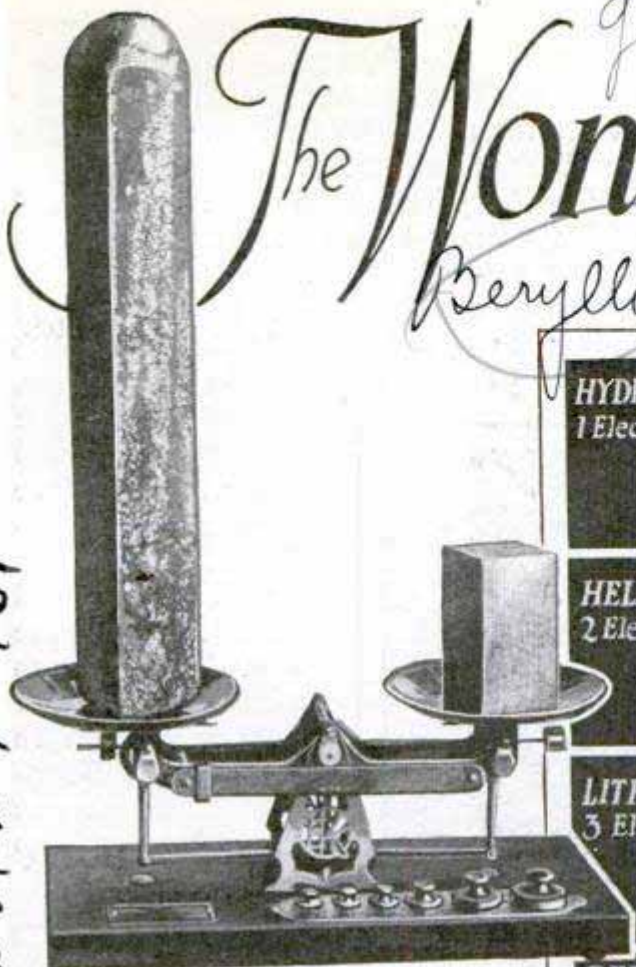
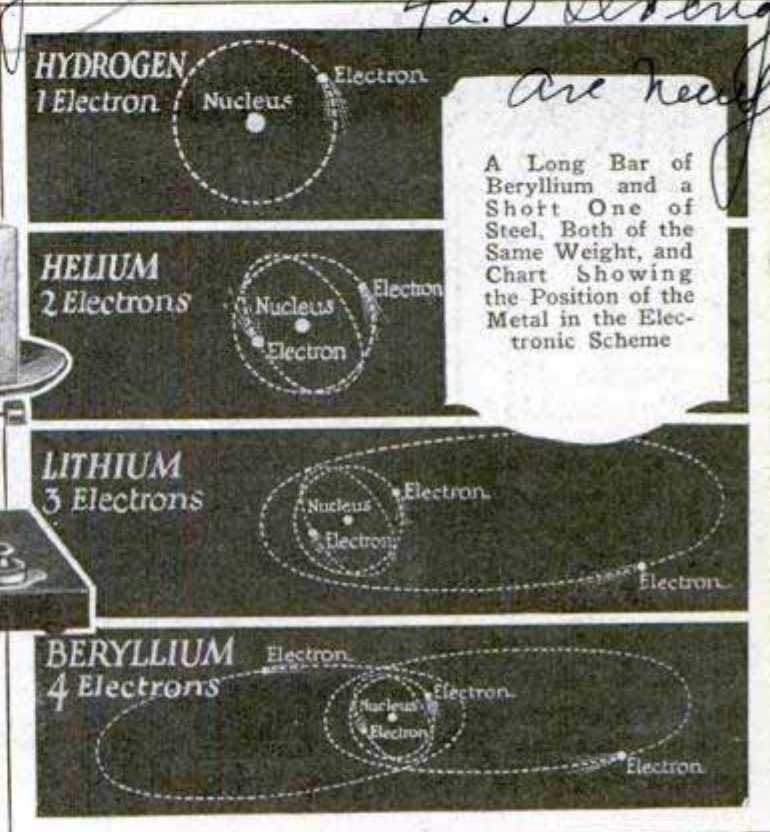
2015 Beryllium Corporation  
 119 W. 57 St. New York  
 of Pennsylvania  
 Reading, Pa

# The Wonder Metal

Beryllium Products Corp.  
 42.0 Lexington

are needed.

A Long Bar of Beryllium and a Short One of Steel. Both of the Same Weight, and Chart Showing the Position of the Metal in the Electronic Scheme



**A WONDERFUL** new metal, one-third lighter than aluminum and with most of the valuable properties of steel, will soon be placed on the market. Assuming that its cost is not prohibitive, its use will greatly reduce the weight of airplane engines, and providing its price eventually becomes low enough, it may also be largely employed in automobiles with vast reduction in weight.

The name of this new metal is beryllium, a chemical element like iron, copper, aluminum and lead. While it is too early to state positively just how extensively the material will be utilized, a preliminary investigation suggests that, when it is suitably alloyed with other metals, it may be employed almost any place where iron, steel and aluminum are now used. If this view proves correct, airplane engines of the future may be built almost entirely of beryllium, weighing perhaps half as much as similar engines today which are mainly constructed of steel, cast iron and aluminum.

Strictly speaking, beryllium is not new. That is, it has been known for more than a century, but during all these years scientists

have been unable to develop a suitable process for the extraction of the metal from its ores. Recently, however, a Cleveland scientist and metallurgist, Hugh S. Cooper, and his associates have developed a patented process which permits production of the metal on a commercial scale, and definite steps are now under way for its manufacture.

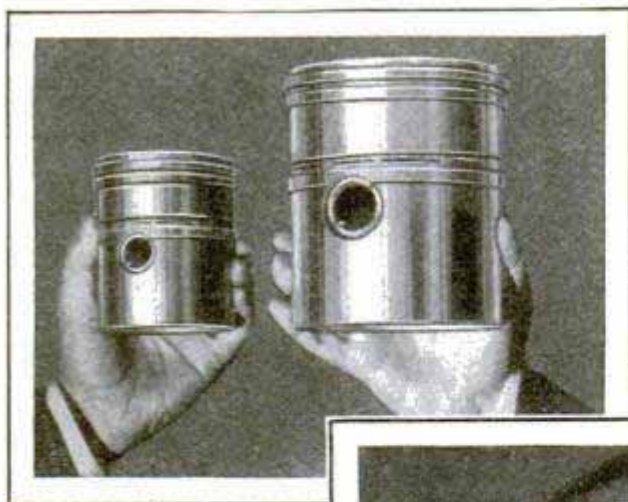
The existence of beryllium was first indicated in 1797 by Vauquelin, a French investigator. Early scientists tried to reduce the ore to secure the pure metal, but it was not until 1828 that Wohler, the celebrated German chemist, succeeded in producing a laboratory sample. Since that date, various experts all over the world have tried to develop a commercial process but, in spite of their efforts, beryllium remained a laboratory curiosity until Cooper worked out his method.

Many people have the idea that beryllium is a rare metal, but this is far from

c/o Kemet Laboratories 603  
 1233 33rd St. New York 17, N.Y.

see April 24 1927-961





true. In the United States alone, the ore occurs in more than fifteen states and is especially available in Colorado, South Dakota, Connecticut and New Hampshire. In the last state, there is a whole mountain of beryl, a hard, stony substance composed of the oxides of beryllium, aluminum and silicon. In short, there is plenty of beryllium ore all over the world, and the rareness of the metal heretofore has been due entirely to the difficulty in separating it from the other elements in the ore.

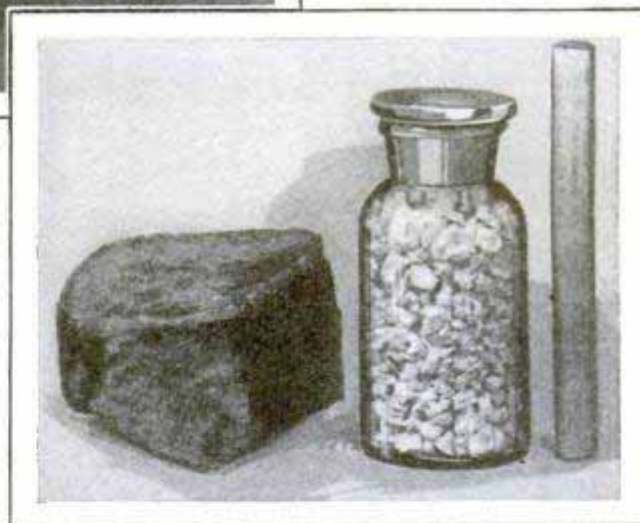
It is still too early to say just what the eventual price of beryllium will be, but experience with the development of other metals suggests that the price will be fairly high at first, gradually being reduced as the scale of production increases and still further improvements in methods of manufacture are worked out. In so far as cost is concerned, the future history of beryllium is likely to parallel the past history of aluminum.

Aluminum ore was discovered in 1700 but separation of the metal from its components was so difficult that it was not until 1828 that Wohler produced a few particles in his laboratory. Others improved the process so that a few years later aluminum could be bought for \$115 a pound. In 1854, Deville devised a new method which brought the figure down to

\$7.00 a pound and refinements on this method later cut the price to about twenty-five cents a pound. The future history of beryllium, it is to be hoped, will show a similar price trend.

Pure beryllium is a dark gray metal which takes a high polish like steel. In fact, a polished specimen might be mistaken for steel until it is picked up, and then it is realized that this stuff that looks like steel is much lighter than aluminum.

It is so hard that it cannot be scratched with a file, and since there is a close relationship between hardness and strength, the pure metal compares with steel rather than aluminum in this respect. Beryllium is about five times as hard as aluminum.



A Small Cast-Iron and Much Larger Beryllium Piston, Both Having the Same Weight; H. S. Cooper, Who Developed the Commercial Extraction Process, and the Three Steps, Beryl, the Rock, Beryllium Oxide, in the Bottle, and the Metal

While pure beryllium is very hard, it is also brittle, and for most purposes its brittleness must be reduced by alloying it with various other metals, such as aluminum, copper and iron. Beryllium and aluminum may be alloyed in all proportions, and this is quite fortunate, because one of the chief difficulties in securing pure beryllium lies in the elimination of the aluminum also found in the ore. Hence it is cheaper to make a beryllium-



aluminum alloy than it is to produce the pure metal.

Beryllium, of course, is so new that most of the possible alloys of this material with other metals have not yet been made and tested, but what has already been done suggests that in a reasonable time an amazing beryllium alloy will be discovered.

### DISTANT SWITCH STARTS AUTO- SAVING DRIVER TIME *2111*

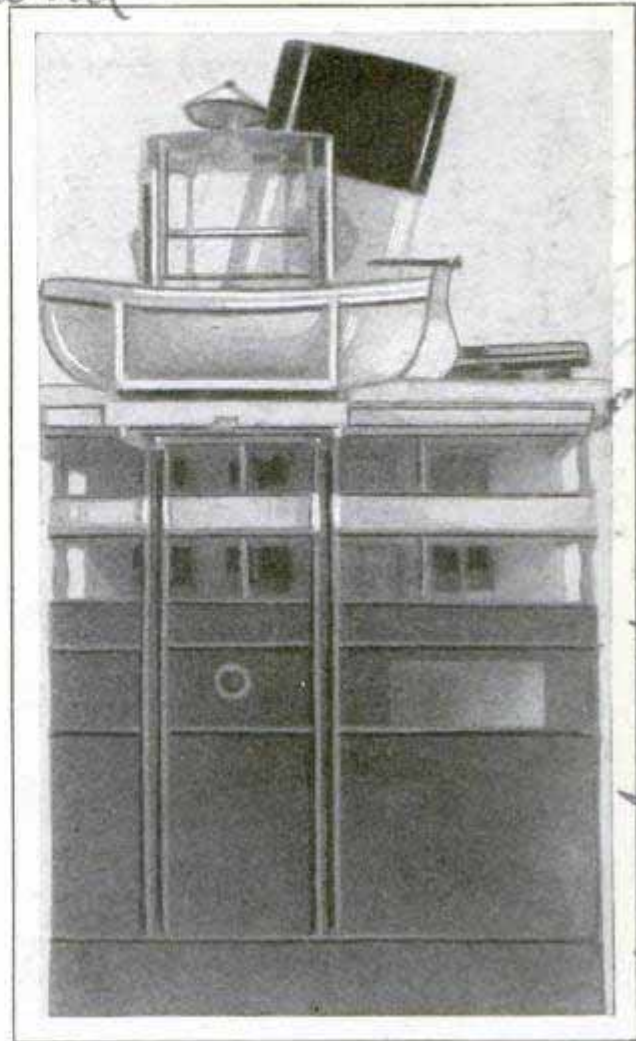
For speedier response to fire alarms, an officer of an English fire brigade has devised a remote-control starter for the motors of the apparatus. Throwing a switch in the office, or other convenient location, starts the engines of the cars so that they are ready to go the instant the driver reaches his seat. The device can be applied to private uses. Physicians, for instance, could install a switch in their bedrooms and start the auto engine running at the distant garage so that time would be gained in answering a call.

### HOLDER FOR BABY'S BOTTLE *2891* FITS ON HIGH CHAIR

Attachable to a high chair or baby carriage, a holder for the nursing bottle is made of spring wire, covered with white rubber. It prevents the infant from spilling the milk or breaking the bottle.



Bottle Holder on Baby's Chair Prevents Breakage and Spilling; It Is Covered with Soft Rubber



Model of Proposed Lifeboat-Lowering Rig, a Track down Side of the Vessel Instead of the Usual Davits

### LOWER LIFEBOAT ON TRACK TO PROMOTE SAFETY *589*

A means for the safer and more rapid lowering of lifeboats has been developed by Capt. A. T. Nelson, of Milwaukee, Wis. Instead of the usual system of davits, he has introduced a track which follows the side of the vessel and permits the boat to be lowered to the water on two rails. They hold the small craft from swaying or tipping and are not likely to be obstructed by ice.

### THREE-STORY HOUSE OF GLASS *2087*

Plans have been completed for the construction of a three-story glass house on top of a New York building. It will be made of glass "bricks," translucent but not transparent. They will be connected by concrete and steel reinforcing. Interesting effects in lighting will be produced at night, when the house is illuminated from within, the architect promises.

*Kansas City Star*

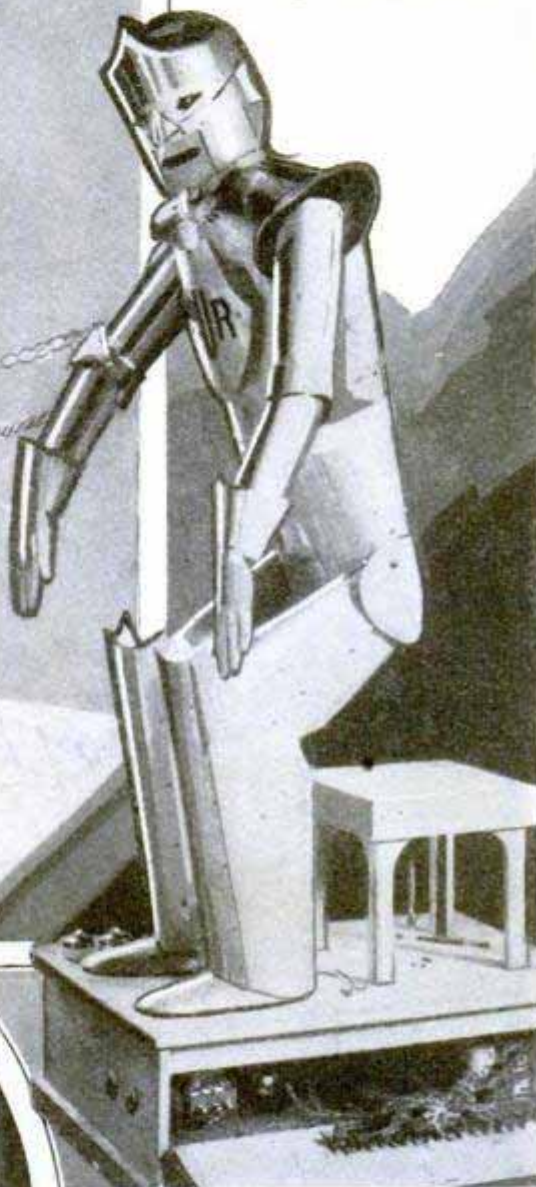


**"ROBOTS" THAT WALK AND TALK, SIT AND STAND,**

see Sept. 1928. (Cont. H. L. & L. D.  
Bergerding  
820 2nd St  
Oakland, Calif.)



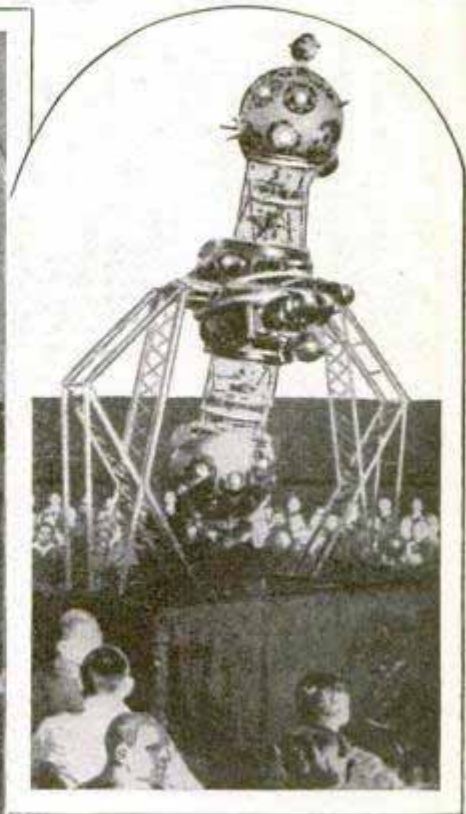
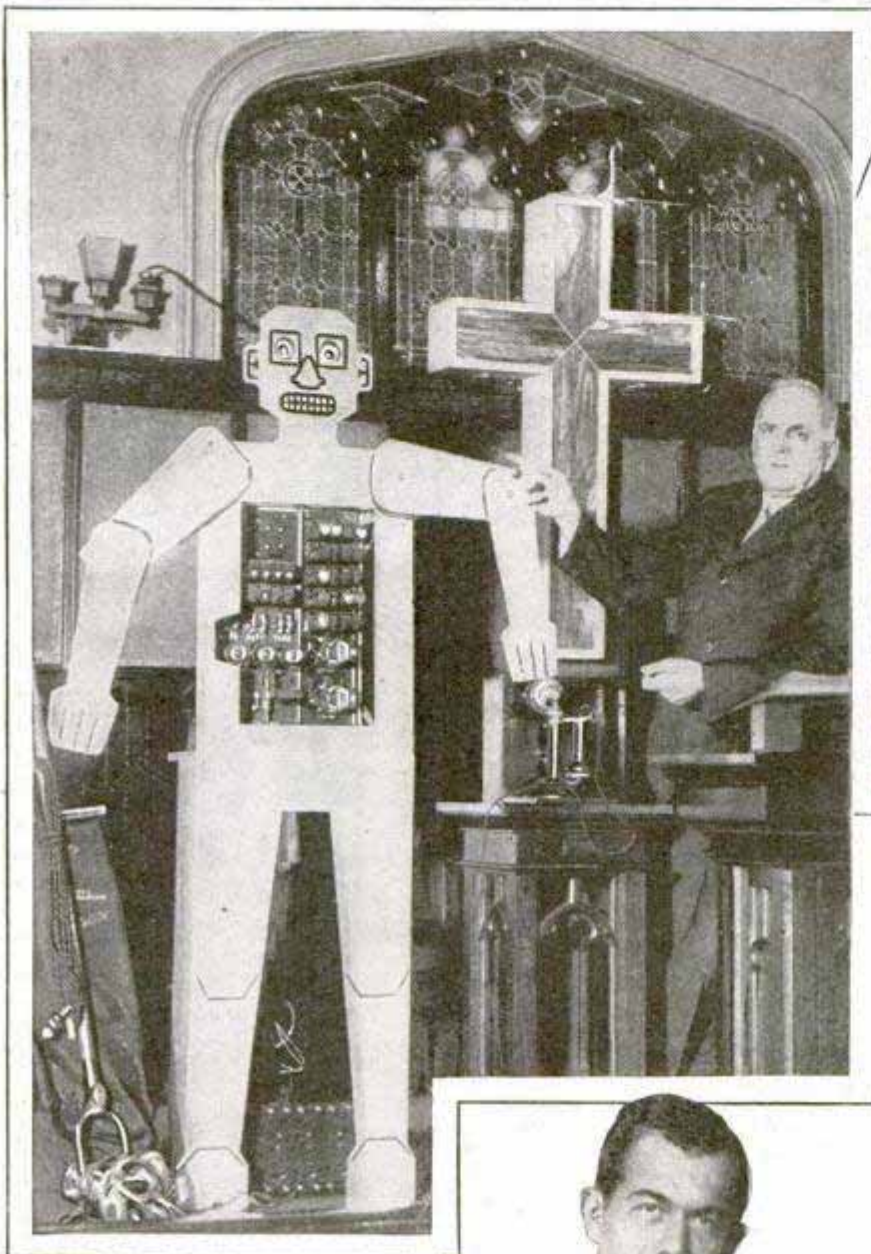
Below Is Capt. A. J. Roberts' Mechanical Man, an English Invention, in the Act of Sitting Down Following a Verbal Order



A Stage Demonstration of What a Brainless Brain Child of Professor Popjie Can Do; "Radiana," the Wireless Barber, Is Shaving a Customer, While the Human Guardian Stands by to Make Sure the Razor Doesn't Slip; at the Top Is a Mechanical Traffic Policeman Used in Berkeley, Calif., to Supplement More Conventional Traffic Signals; the Tiny Policeman Turns to Face the Direction in Which Traffic Is to Be Stopped, While Bells Sound a Warning; the Pedestal Is Also Equipped with a Fire Siren to Stop All Traffic in Case of Emergency; by Combining Wireless, Speaking Apparatus, and the Necessary Motors and Gears, It Is Possible for a Clever Inventor to Reproduce Any Form of Motion

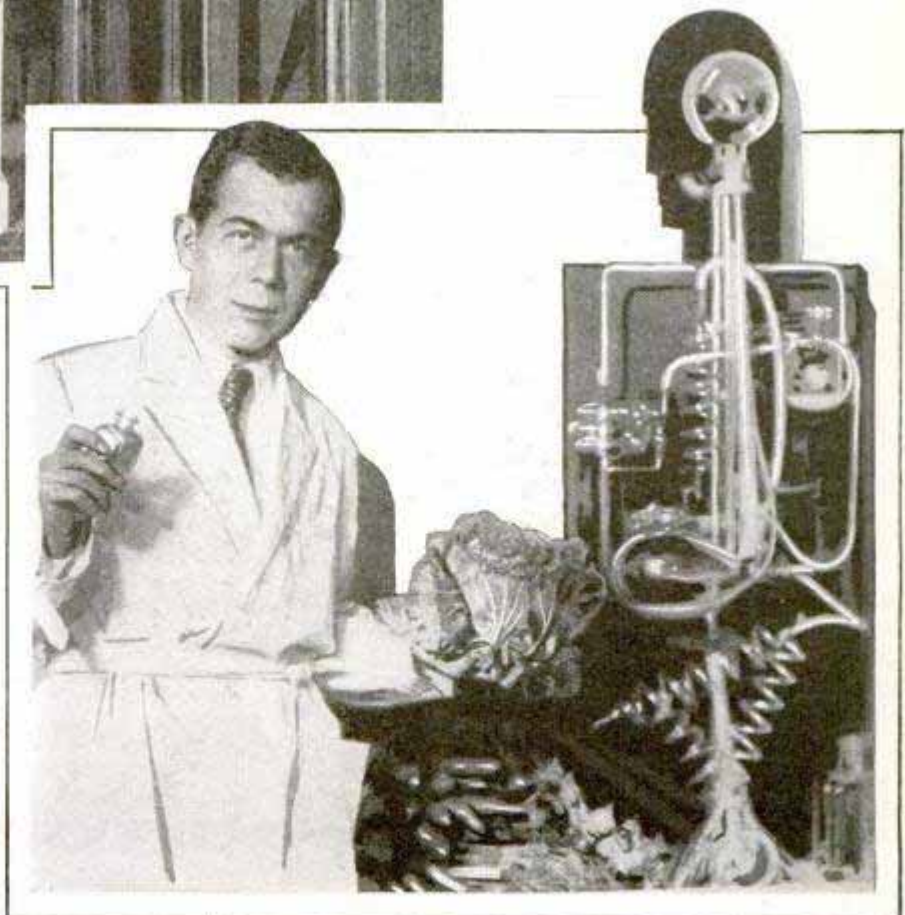


DO EVERYTHING, IN FACT, BUT THINK FOR SELVES



The Weird "Monster" Above Is a Planetarium, Capable of Throwing on a Domed Ceiling the Planets and Stars as They Are, Were or Will Be at Any Date

Built Originally as a Collection of Electrical and Mechanical Parts to Control Machinery from a Distance, Roy J. Wensley's Robot Has Been Dressed Up in Human Form and Goes to Church, as Guest of the Rev. Christian Reisner; the Mechanical Man Can Answer the Telephone and Carry Out Any One of a Series of Orders; in Ordinary Life, One of His "Relatives" Reports on the Condition of the Water Reservoirs at Washington, Eliminating Human Watchmen; at the Right Is Dr. Benjamin Gaylord Hauser with His Chemical Man, Which Imbibes and Digests Food Just Like the Living System, and Thereby Demonstrates in Graphic Form What Happens When We Eat; the Round Bulb at the Top Represents the Mouth, and the One in the Center the Stomach



Cannot locate



*Mr. S. Edward Washburn  
Esq. 46 Wrentham  
Road, Bournemouth  
Eng*

2088



Photo by Ewing Galloway

Replacing Electric-Light Bulbs on Top of the Grand Central Building, New York City; Note the Outer Shields

### SHIELDS FOR TOWER LAMPS HELP PREVENT BREAKAGE

Electric-light bulbs on top of the thirty-six story Grand Central building in New York city are protected with outer glass shields to guard them against damage by winds and driving snow, rain and hail. Bulbs installed in such places, where they are exposed to the full force of the elements, break more frequently than in more protected spots, and special means are devised to reduce replacements to a minimum. Fitting new bulbs is not always an easy task, although, in the case of the Grand Central building, the workers have little difficulty and run small risk of accidentally falling, because the protruding ornaments on the tower offer abundant hand and footholds.

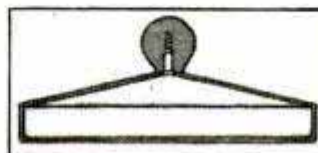
### SMALL BIRD PUTS OUT LIGHTS BY SHORT CIRCUIT

Electric lights in an English town were suddenly extinguished the other night. The cause was a short circuit on the line resulting when a small bird evidently attempted to fly between the wire and the arms of the insulator. Its feathers established a contact, bringing about the short circuit. Such cases are rare, for small birds alight on power lines, on third rails and other conductors without injury to themselves or damage to the system, the reason being that they seldom establish a "ground" whereby the current can be short-circuited. Larger birds often come to grief and sometimes when small birds are flying in flocks, the necessary contact for a short circuit will be established between members of the flock. Small birds are often killed in pairs in

this way if the tail or a projecting wing of one that is sitting on a live wire or rail comes in contact with the body of another bird through which a ground is formed.

### FLOAT PREVENTS SKIN ON MILK WHILE BOILING

To keep skin from forming on the surface of milk while being boiled, a hollow metal float with a knob has been introduced. It is placed on top of the milk be-



fore boiling and removed after the liquid has cooled to about 122 degrees Fahrenheit. The float is made in a range of sizes to fit various pans, and is said to operate effectively.

*d w. L. med  
A. Friedrich & Co.*

*Lander*

2047



2132 Cmh. 6 H. & Laharty  
342 Warwick Blvd  
San Antonio Tex

## "JOY RIDER" FOR AUTOS IS THE LATEST AMUSEMENT



Wayside Thrills for the Motorist; a "Scenic Railway" Idea Adapted for the Automobile in a Drive over Hills Made from Piles of Earth; an Admission Charge Repays the Owner

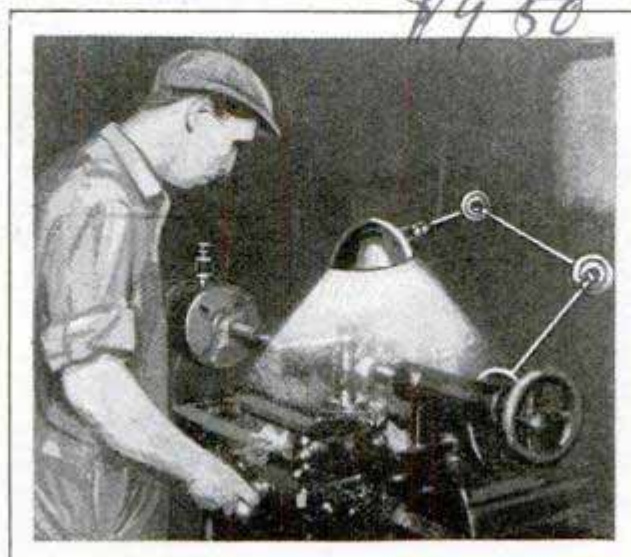
Motorists are enabled to experience some of the thrills of an amusement park without leaving their cars, on a "joy rider" road built near a Texas highway. For an admission charge of ten cents, autoists drive into a large field where a road that passes ocean-wave fashion over a series of small hills scooped up out of dirt, gives sensations like those of a roller coaster.

### ENGLAND BUILDS SECRET PLANE TO SEEK DISTANCE RECORD

A mystery airplane, secretly built in England, was tested recently preparatory to an attempt to break both duration and distance records. The machine, a Fairy-Napier monoplane of 100-foot wing spread, adds Great Britain to the countries turning to the monoplane. Heretofore, practically all British ships, both large and small, have been biplanes. The 450-horsepower Napier engine is reported to have a special carburation system designed to produce maximum horsepower with a considerably lower gasoline consumption than usual. The ship also is said to be equipped with a type of direction indicator which sounds a horn be-

side the pilot's ear if he deviates from the prescribed course. How the system works is a secret, but it is said to be the result of several years' research work. The ship carries 1,000 gallons of gasoline which is kept in wing tanks. The pilot's seat is fitted with pneumatic cushions to relieve the strain of long hours, and a couch in the cabin is similarly equipped to provide a resting place for the relief pilot. There also is a comfortable chair and a folding table for the navigator. It is planned to try first to break the duration record for unrefueled planes, now standing at 65 hours 25 minutes, and then attempt an 8,000-mile flight from London to Cape-town, with only one stop for fuel.

### LIGHT CAST FROM ANY ANGLE BY JOINTED FIXTURE



One of the Many Uses for the Special Light Stand That Has Six Joints

Having six joints of special construction, an electric-light fixture now on the market can be adjusted easily to throw the rays where they are most needed. The fixture may be turned in a complete circle, swung high or low, tipped or turned in any direction, saving time and trouble in re-adjusting the entire standard.

Acrala Inbrine

Stafford Sales, Co.

2126  
2454 N. Lake St.  
Chicago



1943



14,000

that he is one of those rare persons, a natural-born flyer.

That is not to be wondered at, for he comes from the greatest flying family in the United States, and, so far as American and British records show, the world. The flying Stinsons have produced four pilots—Katherine, Marjorie, Eddie and Jack—a record believed to be unique.

How does it feel to have spent 14,000 hours in the air?

"I've never given it a thought," Eddie confessed the other day. "It's the one thing I want to do, and the only thing I know how to do—build planes and fly them. I get in six or eight hours every Sunday, usually

flying down to Chicago from the factory at Northville, Mich., to spend the day with the boys at the airport, and, while we have a test pilot, I usually manage to get in a bit of time on every plane we build."

What those bits of time amount to is indicated by the fact that, in the two and a half years since he became an airplane manufacturer at the head of his own factory and began turning out commercial ships and special jobs for transatlantic and round-the-world flyers, he has managed to keep up his average of around a thousand hours a year in the air. Last year, with Capt. George Haldeman, he took a Stinson "Detroiter"—a six-passenger monoplane fitted with special gas tanks instead of passenger seats—down to Jacksonville, Fla., and set up a new world's endurance record of 53 hours 36 minutes and 30 seconds, the second time in a few years that he held the endurance mark.

Eddie Stinson and His Wife Snapped at Mills Field, San Francisco, on Last Summer's National Air Tour

By J. EARLE MILLER

**E**DDIE Stinson, barnstormer, war pilot and airplane manufacturer, the other day finished his fourteen thousandth hour in the air, a record, it is claimed, no one else anywhere in the world has ever approached.

Fourteen thousand hours represent 583½ days of twenty-four hours each, or the equivalent of about nineteen and a half months in the air, if they were all strung together in one flight.

For a man still in his early thirties to have spent nearly two years in the air is a remarkable thing, but more remarkable still is the fact that after fifteen years of flying, it still holds its lure—the one thing he wants to do. The great majority of flyers, after a few years' experience, retire into something not quite so hazardous, but Eddie Stinson expects to keep on flying as long as he lives. The answer is



# HOURS *in the* AIR



The Stinson "Detroit," in Which the Builder and Capt. George Haldeman Last Spring Broke the World's Endurance Record; a New Ship Is Being Built to Regain the Mark, Now Held Abroad

Both the Italians and the Germans have since bettered that record, but a new Stinson is coming out of the factory shortly to go after it again, and Eddie will be at the controls half the time.

His chief recollection of the two and a fraction days of monotonous flying over the Florida coast last spring is that it allowed him to catch up in his lost sleep.

"We carried an eiderdown quilt and a supply of magazines for entertainment," he explains. "The one off duty would stretch out, read a bit and then go to sleep. I got almost twelve hours sleep out of each twenty-four. About the only discomfort was watching George's beard grow and wishing we would get it over with so he could shave."

Haldeman was no novice at long flights in a "Detroit," for he piloted Ruth Elder almost to the Azores on her ocean flight.

The flying Stinsons' connection with aviation is almost as lengthy as that of the Wright brothers. Along about 1903 and 1904, when the Dayton bicycle men were making their first flights with power, a boy in knee pants, down in Mississippi, with the assistance of two sisters, was building glider-type kites. The trio were Eddie, Katy and Marge, who grew up to be, respectively, an airplane builder and a pair of famous women dare-devils.

By the year 1909, when the Wrights were winning their first world-wide recognition, the Stinson children were getting 200 and 300-foot flights in gliders big enough to carry them and attaining the

respectable altitude of ten to fifteen feet. It must be remembered that the Wrights did most of their power-airplane flying at that time around fifty feet above the ground and publicly announced they saw no reason for going higher.

Katherine went to Chicago in 1912 and learned to fly a Wright Model-B, a curious contraption that a spectator described as a rather flimsy front porch with a pilot sitting out on the steps. At the same time Eddie, who had reached the respectable age of seventeen, was building his own machine, with the help of a couple of garage mechanics, in St. Louis. There wasn't any suitable engine on the market, so they built that, too.

The finished product bore a close resemblance to the Wright, even to the pair of chain-driven pusher propellers in the rear. With it he did a lot of ground flying and learned to handle a plane perfectly up to the moment it reached flying speed and took to the air. Every time it got off the ground, however, the trip wound up in an accident, and the machine had to go into the shop for repairs. Finally it had been crashed and repaired so many times the builders ran out of places to put fresh patches and Eddie decided to go down to Dayton and enter the Wright school, an arrangement which had the advantage that the cost of tuition included all repairs, if the student cracked up the school ship, the singular being correct as, most of the time, the school had only one plane.





Stinson in the Plane, and the Mayor of Jacksonville Wishing Haldeman Good Luck before the Start of the Flight

Katherine already had become a famous state and county-fair attraction, and Marjorie went through the Wright school that same summer of 1914 and followed in her sister's footsteps, while Eddie went barnstorming, too.

The family had moved to San Antonio, and put that ancient Texas town on the flying map long before the army made it the greatest flying center in the country by establishing there Brooks and Kelly, the chief primary and finishing flying

schools during the war and since.

Eddie says the funniest experience in all his 14,000 hours happened at San Antonio while he was still in his teens. He was flying a Wright model, home-made, and, by permission of the commandant, was using the parade ground at Fort Sam Houston as a flying field. One day the commanding officer served notice he would have to move away, as the army was sending down four ships to establish the nucleus of an air corps at Ft. Sam Houston, and it wouldn't be safe for a kid in a forty-mile-an-hour Wright to be fooling around in the air when four fast "Jennies,"

ships capable of as much as eighty miles an hour, were in the same vicinity.

So the young flyer went out and located his first field, a level track south of town, borrowed a pair of sheets from his mother, staked them down to mark the spot, and returned to the fort to start his first cross-country flight, a journey of seven miles.

All went well the first half of the distance, and then, as he shoved the control stick forward to nose down and lose some altitude, nothing happened. He kept on

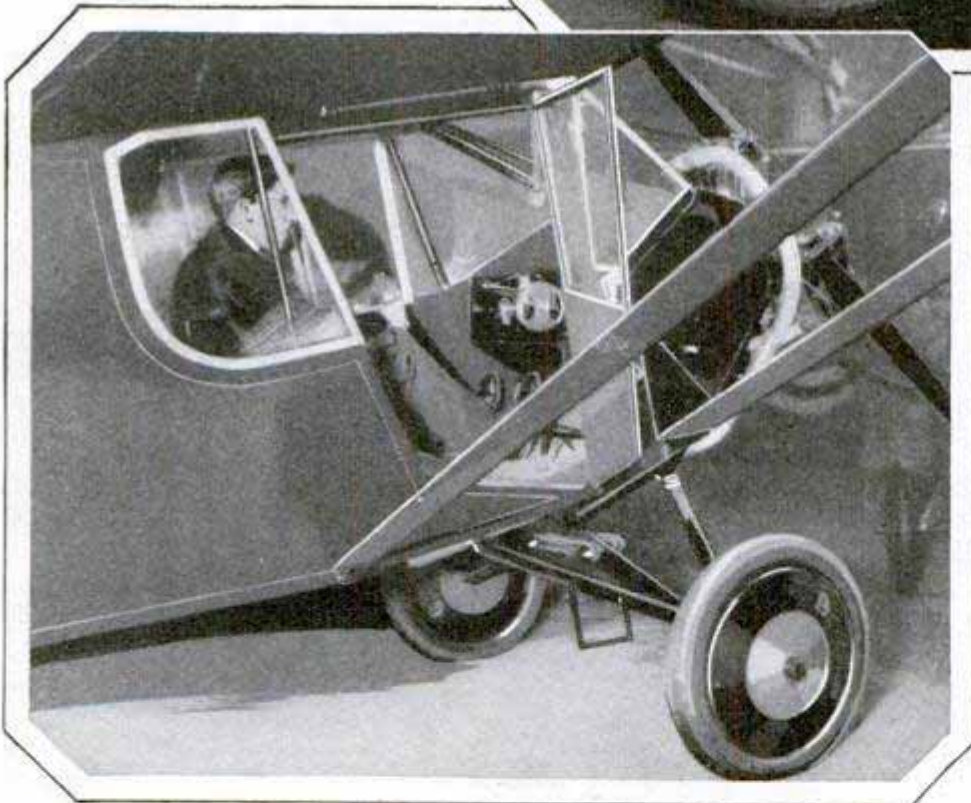


The New Fairchild "21," a Low-Wing Monoplane Designed as a Training Ship for Student Instruction, Is Typical of the Drift Away from the Biplanes of Recent Years



shoving until he had the stick all the way down to the cross-bar on which his feet rested, with the result that finally, perhaps because of the displacement of his weight, the home-made plane went into a dive.

Back came the stick until it was pressed tight against his chest, and again nothing happened. He squirmed sidewise out of the seat and kept on pushing until the stick was where he had been sitting, and then the plane nosed up. At the same time he located the source of the trouble. A bolt which acted as a pivot for the elevator controls had sheared off, and instead of going up and down when the controls were moved, the elevators were



Typical Two-Passenger Coupe of the Air, and, Above, the Retractable Landing Gear of the Fokker Amphibian Pulling Up into the Stub Pontoon Wing

his new field, until finally his ship was not more than thirty feet from the ground.

Afraid to try another dive, he shut off the ignition and let the plane settle to the ground, making a landing in a corner of a cemetery without breaking anything. The sexton ran over to investigate, and Eddie explained he couldn't get out of the cemetery until he got a three-sixteenth-inch stove bolt to repair the

controls. The sexton thought one might be found, and together they rummaged through all the junk in his storeroom, without success. Finally the sexton inquired if the boy flyer was superstitious, and volunteered the information that one of the vaults contained an ancient iron-plate coffin, fairly studded with bolts.

By alternately shoving the stick all the way down and pulling it all the way back, he succeeded in descending in a series of short dives, all the time hoping to reach

Together they rolled back the stone



cover, inspected the coffin and found a bolt just the right 'size. Repairs were made, young Stinson took off and landed safely beside his mother's sheets at the new field.

It was on the same field that Marjorie won the title of the "Flying School Ma'm," when she opened an aviation school and became the first woman pilot to give flying lessons. She and Eddie together trained a large number of flyers for Canada before the United States went into the war, while their mother helped manage the business.

One of the queerest of flying incidents happened during that period.

"We had a student," Eddie says, "who didn't want to fly, and was afraid to fly. He was of army age, and if he had to go into the army, he had decided he wanted to be an officer, so joined up to get a flying commission. In private life, he had been a ribbon clerk, and if anyone ever looked and acted as you would expect a ribbon clerk to look and act, he did.

"We labored and labored over him, and finally one morning he made three fairly decent landings in succession, so I told him to go ahead and solo. To get his ticket, he had to take off, go up and do two figure eights, and come down and make a good landing within a certain distance from a mark.

"He made a perfect take-off, climbed to the right altitude, did a pair of as nice figure eights as anybody ever saw, circled out downwind, turned and came into the

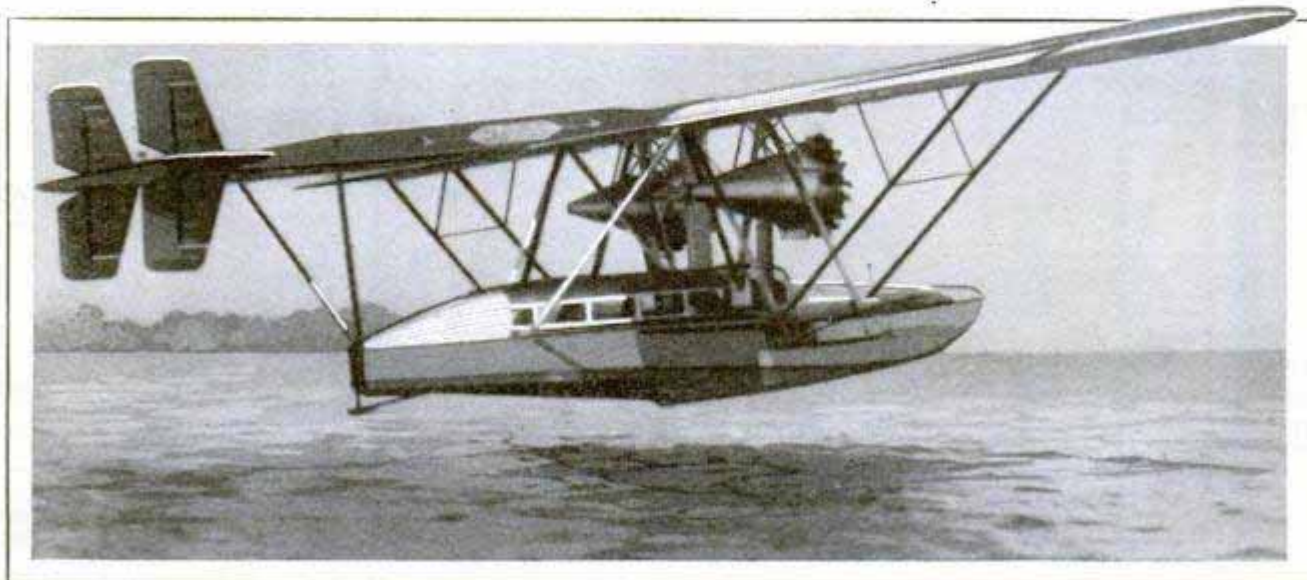
field at just the right altitude, at the correct moment he cut the gun and nosed down in a gentle glide, leveled out just when he should, pulled the nose up as the plane lost speed, and was settling for a perfect three-point landing, with the plane hardly six inches off the ground, when he lost his head and jumped overboard.

"The ship landed and rolled along to a stop, while the student was nearly killed from the head-first impact at thirty miles an hour."

With the entrance of America into the war, Stinson was commissioned, and immediately assigned as an instructor to Kelly field. There he stayed, for there were plenty of students to send to France, but good instructors were rare. As "final check" pilot at Kelly, no student could graduate until he had a certain number of minutes in the air with Stinson and received his O. K.

At Kelly, Stinson became famous for two things: his stunts with a ship of his own design, and his ability to break light globes with a wing tip, the last of which proved a remunerative occupation, as there was always a certain number of people willing to bet it couldn't be done.

Every structure around a flying field is marked with a red warning light, one of the most prominent being the light atop the flagpole. Eddie's usual bet was \$100 that he could fly over the flagpole and gauge the distance so accurately that he could crack the glass globe off by brushing it with a wing tip, without damaging



The Twin-Motored Sikorsky Amphibian, a Luxurious Aerial Yacht; When Its Wheels Are Lowered, It Can Land on Any Fair-Sized Field, or Draw Them Up and Alight on Water





Looking Forward in the Cabin of the Sikorsky Amphibian; the Two Pilots Are in a Separate Compartment, and the Kitchenette and Lavatory Are at the Rear of the Ship

his ship. As a collision with the flagpole at a flying speed of eighty miles an hour or more would be fatal to both ship and pole, there were frequent takers of the bet, but they invariably lost.

His little homemade monoplane handled so perfectly that one of Stinson's favorite stunts was to climb the side of the field water tank, drop across the top and go down the other side until the ship picked up flying speed. To do the trick he flew straight at the water tank, with his wheels just off the ground, pulled the stick back just before a crash seemed unavoidable, zoomed the ship up the side of the tank until it lost flying speed just above the top, shoved the stick down and flipped over the top, then down the opposite side until he got speed, when he would pull the ship up and level out again.

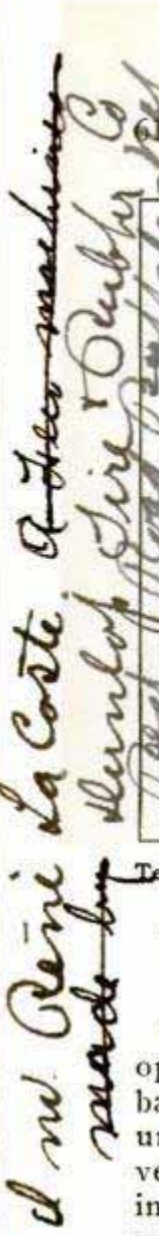
What his 14,000 hours of flying represents can be visualized by reducing it to mileage. Forty to forty-five miles was top speed in the early days, but 150 and better is common now, so it is safe to say he has averaged better than 100 miles an hour over the 14,000 hours. At that rate, his 1,400,000 miles represents three round trips to the moon and back, which is a respectable lot of miles.

### BLOOD MADE WITH CHEMICALS TO HELP GAS VICTIMS 2148

One of the iron substances found in the blood has been prepared synthetically by a German chemist, according to reports. It is expected that the discovery will be useful in cases of gas poisoning, although at present blood transfusion is cheaper.

Prof. Hans Fischer





d m. Peni La Coste. ~~A few machines~~  
made by Dunlop Tire & Rubber Co.  
Pat. of Dunlop

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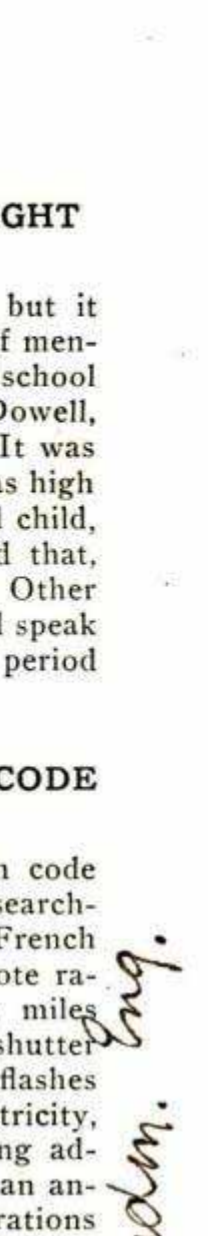
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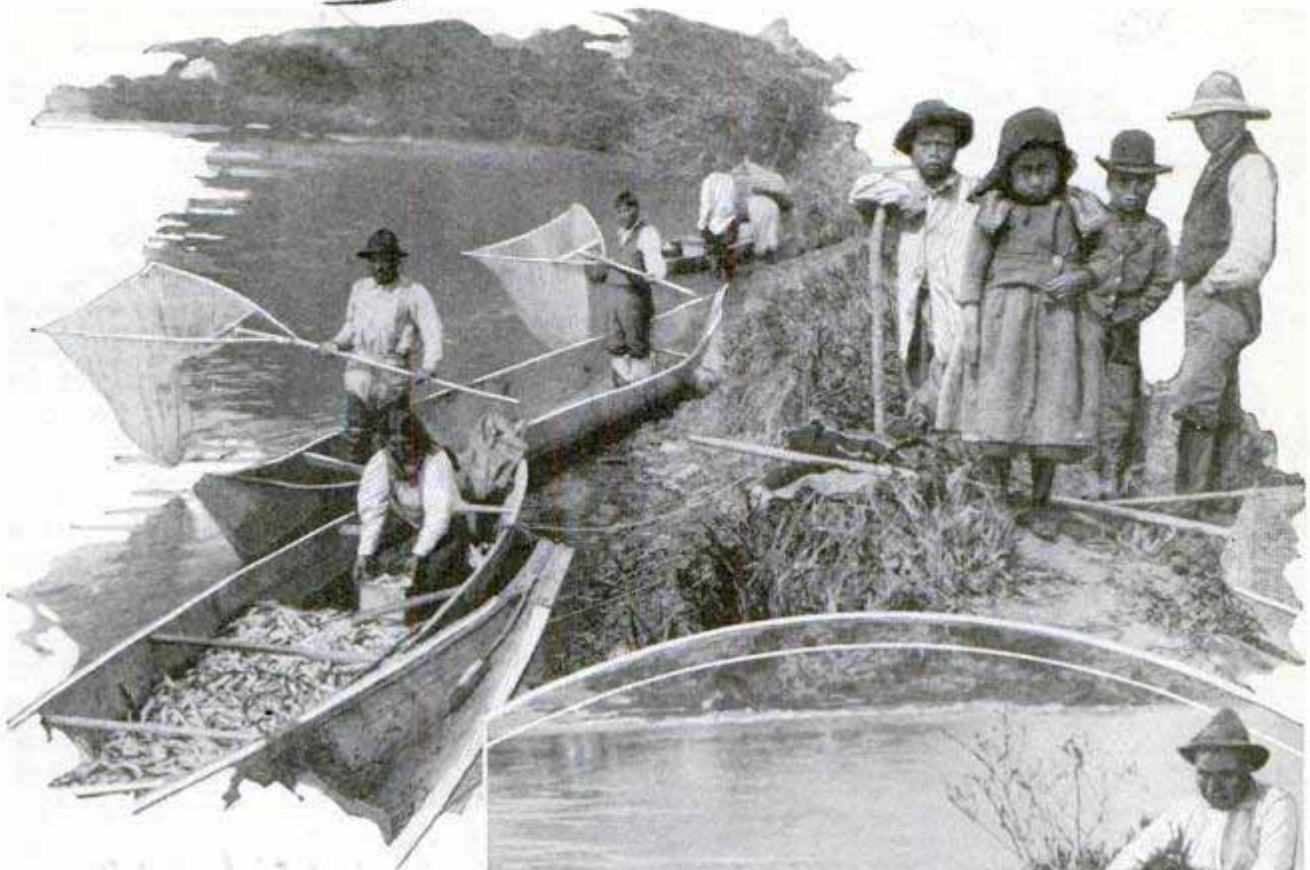
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Indians at "Hooligan" Fishing Time; These Fat Little Fish Yield Oil That Serves as Lard or as Substitute for Ice Cream

In the Pacific coast region, nature was generous in supplying the aborigines with food resources. Many of the primitive industries still exist. They are quaint, picturesque, and are conducted along the simplest lines. One of the most romantic and colorful of these is the harvest of the eulachon, or "Hooligan" fish, by the natives of southeastern Alaska. Picture a river of purest azure, a glacial stream winding through a valley heavily timbered with spruce and fir, above the tops of which snow-capped mountains tower majestically. On the bank of the river, Indians, clad in nondescript but picturesque garb, toil or play in the hot sunshine of the short Alaska summer, the men sweeping the waters of the stream with crude dipnets and the women scurrying up the bank with baskets filled with gleaming fish. The eulachon is said to be the fattest of all fishes, and both the meat and the oil rendered from it have a



peculiarly delicate, agreeable flavor. In the early days of Alaska gold discovery the eulachon was used for purposes of illumination by the miners, who called it the candlefish. It may be dried, thrust in the neck of a bottle, and burned like a candle. The Alaska Indian likes the oil of the eulachon better than other fish oils, and the flesh is sometimes eaten dried and smoked. The Canadian government purchases much of the oil for its Eskimo wards in the far Arctic. It is considered an excellent substitute for lard. One of the favorite dishes among the coast Indians is prepared from eulachon oil and is a native substitute for ice cream.





The Man Standing in the Dipper Gives Some Idea of the Enormous Size of This Shovel

Courtesy General Electric Co.

## MAMMOTH SHOVEL BEING BUILT TO BREAK ALL RECORDS

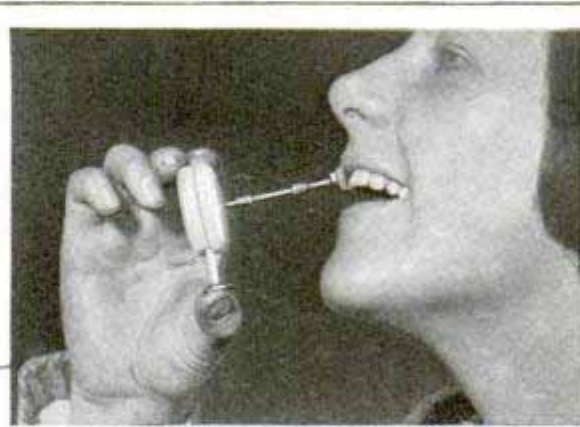
Spurred by the success of several twelve-cubic-yard-capacity electric excavating shovels put in operation last year, a fifteen-yard unit is nearing completion, to be the largest in the world. Some idea of what a fifteen-cubic-yard shovel means may be gathered from the fact that the dipper will bite out eight large motor-truck loads of material at a single gulp, or enough earth to fill a trench six feet wide, sixty-eight feet long and a foot deep. The machine will have a boom 120 feet long and a dipper stick of eighty feet. A single man, with one set of hand levers and one set of pedals, will control every operation of the giant, according to the General Electric company, which is building the motor equipment. Power will come to the shovel through a trailing cable nearly three inches in diameter and about a thousand feet long, which will be wound on a reel at the rear.

## PLANE RESCUES INJURED NUN IN ALASKA

Winging his way northward over Alaska, an aviator went to the rescue of an injured nun at the St. Peter Claver mission in Nulato recently. She was carried 400 miles in the plane to Fairbanks, where surgeons set her broken leg. The Rev. Father Joseph F. McElmeel, priest at the station, heard the faint whir of the airplane. He hurried to the post office, secured the aid of the signaling agent there, and in a few moments, the plane had landed and arrangements were made for taking the suffering nun to Fairbanks the next morning.

## SPRING-MOTORED TOOTHBRUSH FOR POCKET

Giving the toothbrush a rotary instead of a sideways movement is recommended by dentists, and this is the natural action of a revolving brush now on the market. It has a small motor which causes the brush to spin rapidly when a tiny handle is pushed. The entire outfit can be carried in the pocket, is



Operating the Rotary Toothbrush; a Spring Motor Spins the Shaft and Buffer at Rapid Rate

easily kept clean and is said to be beneficial to the teeth and to the gums.

Can not locate maker



206. Em. Dr. Alfred Rosenhagen  
Koselerstrasse 20,  
Berlin. Friedenau Germany  
Under  
Victoria  
Cable  
Production and Marketing  
Wandsworth House



© Tropical Press Agency

Dr. C. J. Hedley-Thornton Examining Some Samples of "Artificial" Cotton in Various Stages of Treatment; a Bird's Nest Led to the Accidental Discovery of the Plant

A SUBSTITUTE for cotton, discovered by accident in a Central American bird's nest, has quietly been put in production in England, and, with its recent announcement, it was stated that a sufficiency could be grown within another two years to fill fifteen per cent of the world's demand for cotton cloth and cotton products.

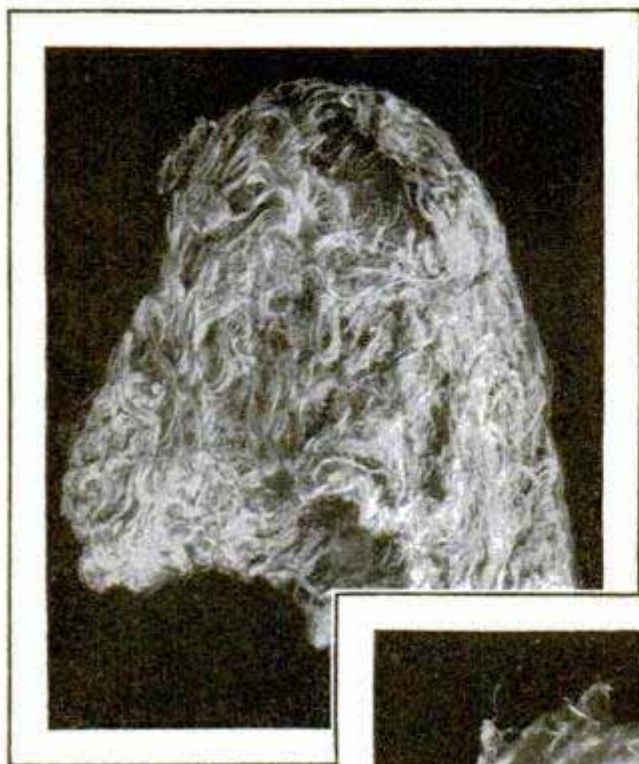
The new fiber comes from a weed, found growing wild in British Guiana. Dr. C. J. Hedley-Thornton, of London, an expert in the study of cotton pests, particularly the boll weevil, was in Guiana with a party of scientists when they discovered a bird's nest, apparently made from cotton. As no known cotton supplies were within reach of the bird, they watched, and eventually traced the nest builder to a weed from which it obtained the building material. They found nine different varieties of this weed, all very similar, but only one variety yielded the cottonlike fiber selected by the bird.

Samples of the plant were taken to England and cultivation attempted. De-

spite the change of climate, the weed thrived, and, by careful crossing and re-crossing of selected specimens, in a few years' time began yielding plants five to seven feet high, with a far superior output of fiber. The plants grew well in even poor soil, and, so far, no insect pest has been found to attack them. Considerable areas in Sussex and Essex have been under cultivation for some time, with an average yield of 800 pounds to the acre, the acre yield being valued at \$100.

Cloth made from the fiber has been distributed, without even experts detecting the fact that it did not come from a genuine cotton plant. Before going to the mills, the fiber is chemically treated, but from then on the process of converting it into usual cotton-product forms does not vary from existing methods. It is readily mixed with silk, artificial silk or wool to produce blended fabrics, and is bleached, printed and dyed in the usual manner. The cloth, it is claimed, has a higher sheen than ordinary cotton, so





much so that a blend of ten per cent artificial silk and ninety per cent of the new cotton makes a satisfactory silk substitute. The makers claim it takes color much more easily than ordinary cotton, and requires only about one-third as much coloring matter for dyeing.

Instead of picking the fiber in the field, the plants are reaped by machinery and sent to the mills for separation. It is impossible to grow new plants from seed, as they will revert to the wild characteristics. Instead, the roots are dug, the old root having decayed and left three fresh offshoots. As a result, after each acre's crop has been dug, there are sufficient new roots to plant three acres the following year.

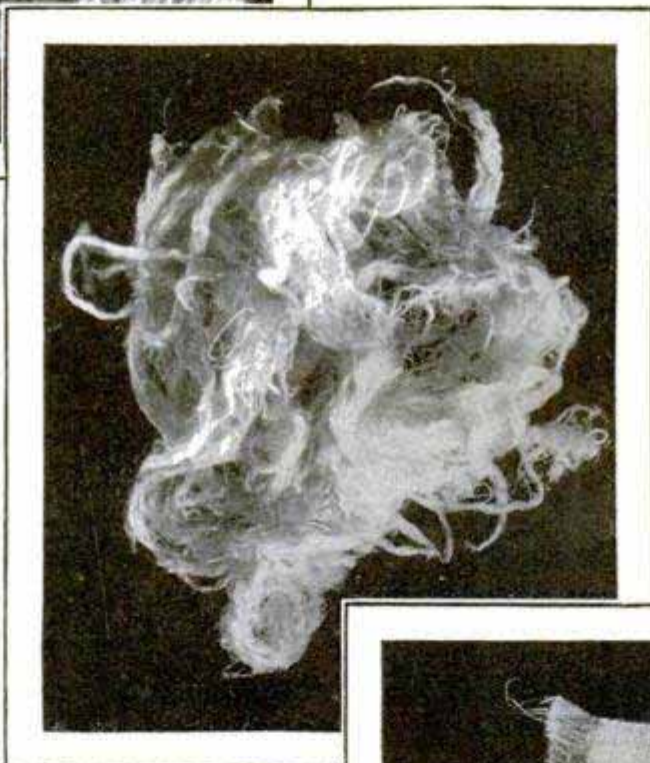
After the fiber is removed from the plants, the leaves can be salvaged and made into serviceable paper and the stalks into building board. Excess roots also can be utilized through the extraction of a new drug.

The progress of the development is being watched with interest in England, not

only because the crop may be grown with profit on poor waste land, but because its cheapness promises to revive the cotton-spinning industry, which has suffered considerably in recent years. Neither American nor Egyptian cotton, it is claimed, can be laid down at the Lancashire mills at prices which will enable them to compete with the new product.

Chemical and structural tests of the cloth woven from the weed fiber indicate it is stronger than cotton, and also more elastic. So far, it has only been woven in the coarser grades.

Doctor Hedley-Thornton anticipates no difficulty in weaving fine cloths comparable with the best cotton fabrics, and the Lancashire mills are experimenting with the fiber preparatory to attempting to invade the entire cotton field. With the production in the hands of one company a price of 12½ cents a pound has been put on the fiber.



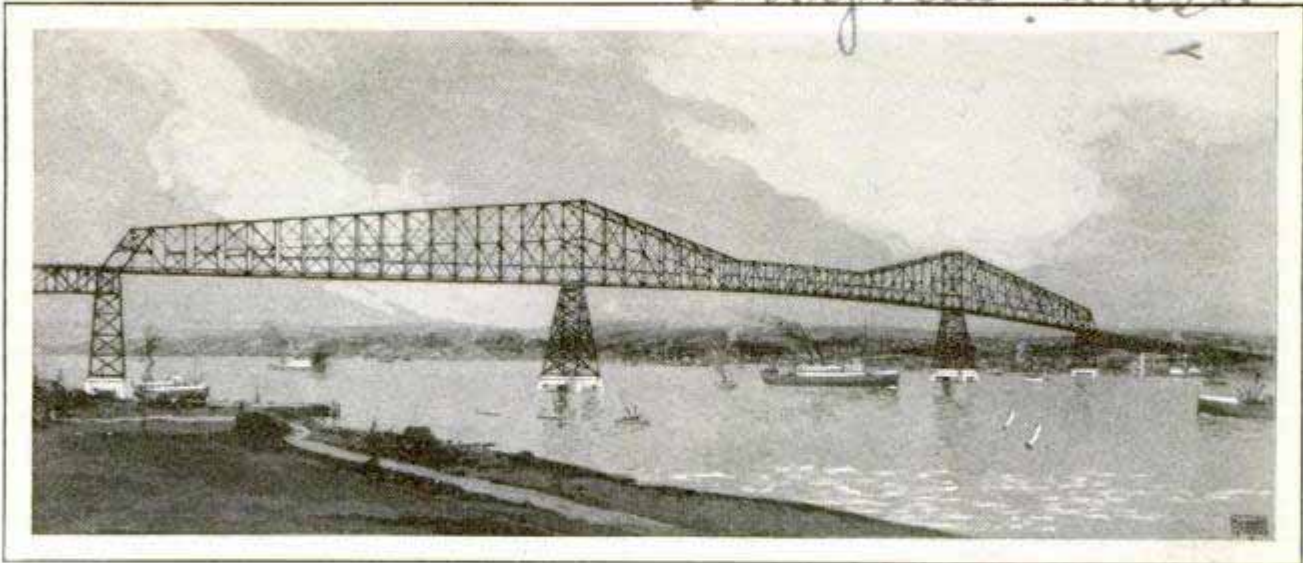
The Bird's Nest That Led to the Discovery of the Plant, Top; Fiber after Treatment and Ready for the Mills, Center, and Coarse-Count Fabric Woven from the Fiber



2105

1623-25th Ave.

Longview, Wash.



Drawing of the Automobile Toll Bridge That Will Connect Oregon and Washington; It Is to Cost Nearly \$6,000,000 and Will Be More Than a Mile and a Half Long

## LONG TOLL BRIDGE FOR AUTOS TO LINK TWO STATES

Another impressive bridge construction is under way on the Pacific coast, where a steel link is being thrown across the Columbia river to connect Longview, Wash., with Rainier, Oreg. The bridge will have a clear height of 195 feet, amply sufficient to allow tall-masted vessels to pass beneath; will be more than a mile and a half long, and will cost approximately \$5,800,000. More than 13,000 tons of steel will be required. It will be operated on a toll basis. More than 600,000 vehicles will use it during the first year it is completed, engineers estimate. Work is to be finished about Feb. 1, 1930.

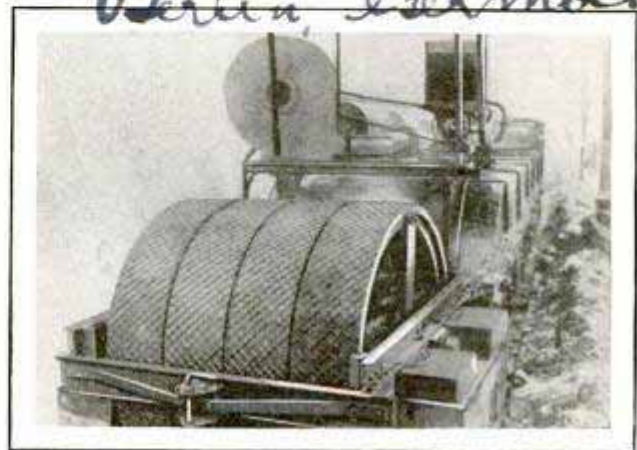
## FOUR THOUSAND AIR ENGINES DOOMED TO BE JUNKED

Four thousand Liberty engines, brand-new and still in the original crates, are doomed as junk, as a result of the action of the house of representatives in placing an official ban on their use in new airplanes ordered by the army. Ten years ago the Liberty engine was the finest aircraft motor in the world, but engine building has progressed so far in the years since the war that the big twelve-cylinder Liberty is now branded a menace to aviators, besides being uneconomical to use. Congressman LaGuardia, of New York, a war-time flyer, was responsible for the decision to replace the surplus engines with more modern motors. He cited figures from

General Fechet, chief of the army air service, to show that Liberty engines were three times as dangerous as the modern Wright "Whirlwinds" and "Cyclones," Curtiss "D-12's" and Pratt and Whitney "Wasps" and "Hornets." LaGuardia recommended that none of the engines be sold for use in civilian planes, and that they be converted into scrap. Some reconditioned Liberties have been sold for use in fast motorboats.

## ROUGH ROLLER FOR HARD ROADS TO STOP SKIDDING

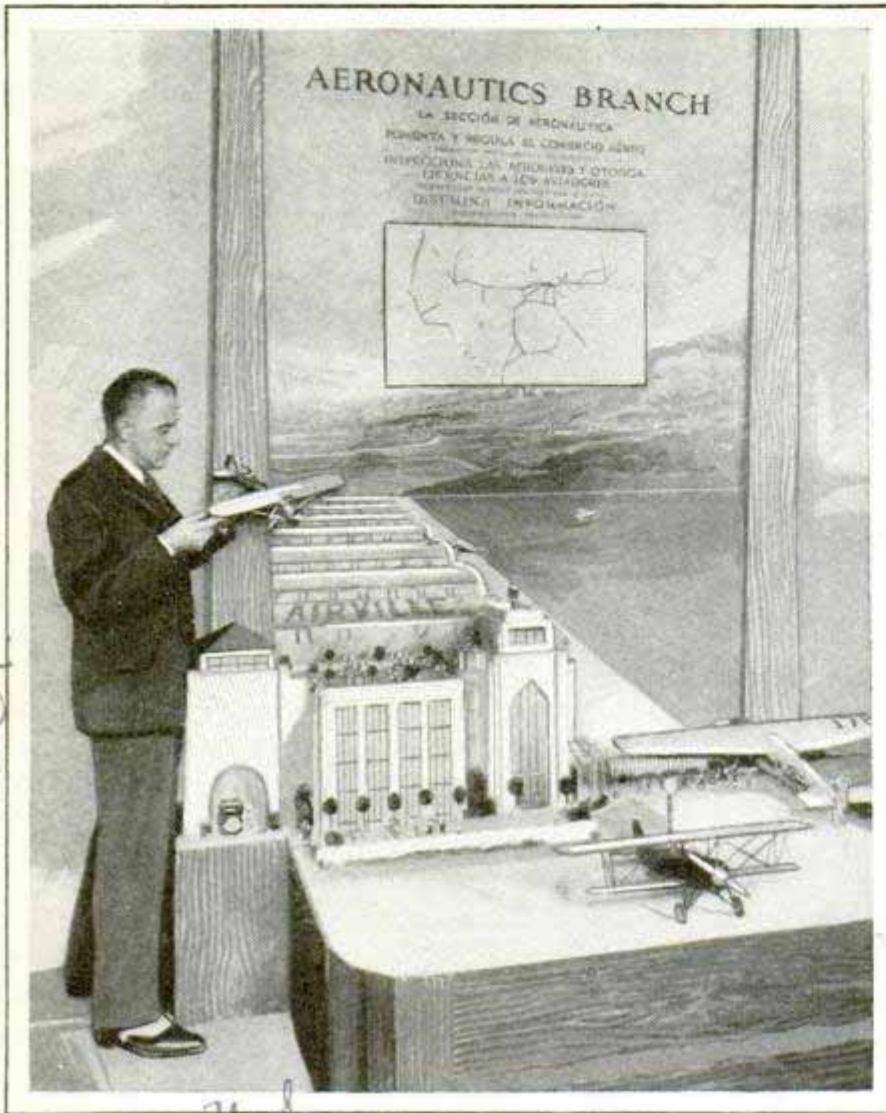
On some of the hard roads about Berlin, a specially constructed roller is applied to roughen the surface and thus reduce the likelihood of automobiles skidding. The plan in effect gives a tread to the road without damaging the material or causing discomfort in riding.



Rough Roller That Puts a Non-Skid Surface on Hard Road for Safer Auto Driving

news of the industry. Cannot locate maker





Model of Airport Department of Commerce Prepared for Exposition in Seville; It Embodies the Latest Improvements

### AIRPORT LIKE COUNTRY CLUB HAS MANY LUXURIES

For exhibition at the international fair in Seville, Spain, the department of commerce has prepared a model of an airport. It shows luxuries and conveniences commonly associated with country clubs, and similar places, and also has small replicas of most of the latest safety devices developed for aviation fields.

### BOULDER DAM UP TO STATES BORDERING ON RIVER

With the passage of the Boulder dam bill by congress and its signing by President Coolidge, the greatest flood-control, irrigation and power-development scheme in American history is now up to the states bordering on the lower Colorado river, waiting for their acceptance of the

terms. Under the bill, the government is to advance \$165,000,000 to start the project, with the idea that the money eventually will be repaid out of power profits. If the states accept the terms and the dam is built, it will be the highest on the continent, taller than the Washington monument; will impound a mass of water sufficient to cover five New England states to a depth of one foot, and will stop the river from carrying down to the sea each year enough silt to fill the whole channel of the Panama canal. While the primary purpose behind the scheme is flood relief—to prevent the river from overflowing the immensely rich Imperial valley, a truck garden that once was the bottom of the sea and is now below the river level—the power developed is expected to pay for the work. As a side line, a hotel and resort may be

developed on the west bank above the dam, from where boats can travel up to the Grand canyon. The site is not far from Las Vegas, a desert stop on the Los Angeles-Salt Lake air-mail and passenger line.

### ALUMINUM MILK-BOTTLE CAP HELPS GUARD HEALTH

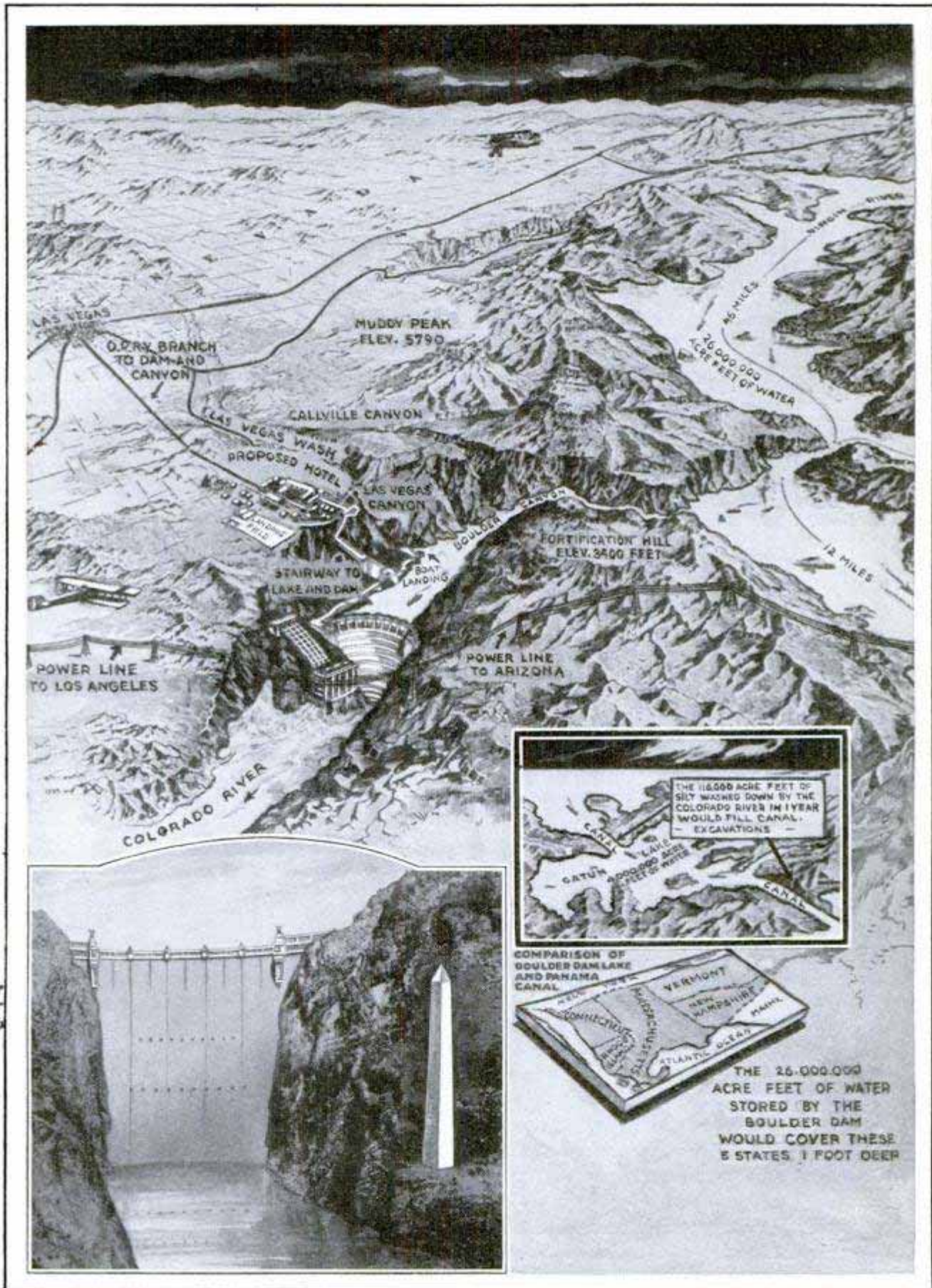
To keep dust and germs out of milk bottles, an aluminum cap with a hinged cover opening for pouring, snaps on the top of the bottle. It is easily adjusted and tightly seals the container.



National Company  
Boulder, Colorado

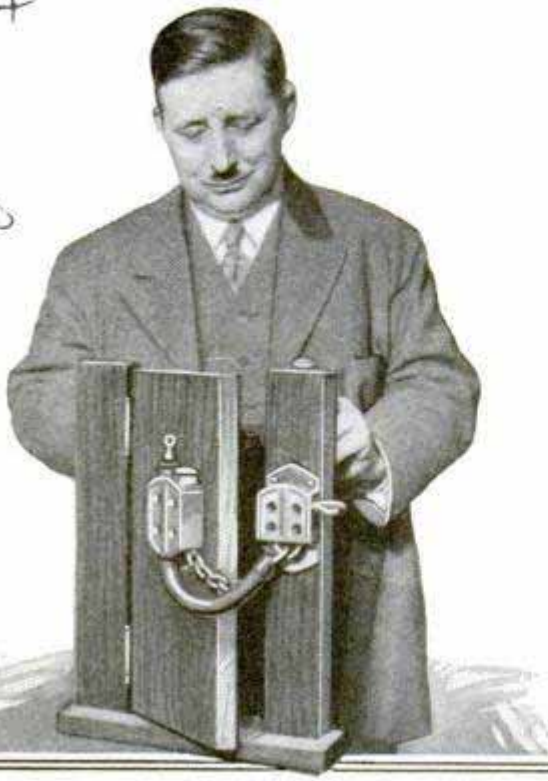


## AMERICA'S GREATEST RECLAMATION PROJECT



Bird's-Eye View of the Boulder Dam Site; the Grand Canyon Is Several Miles to the Right of the Storage Lake; Insets, the Dam Compared with the Washington Monument, and Visualization of What It Will Mean to the West





Model of Lock, the Chain of Which Contains Penetrating Gas Intended to Rout Burglars

### CHAIN LOCK RELEASES GAS TO FOIL THIEVES

Fumes of penetrating gas are contained within the chain of a lock that an eastern inventor has introduced to discourage thieves. Should the chain be cut, broken or otherwise tampered with, the gas is released and is intended to overcome anyone who is attempting to force an entrance without a key.

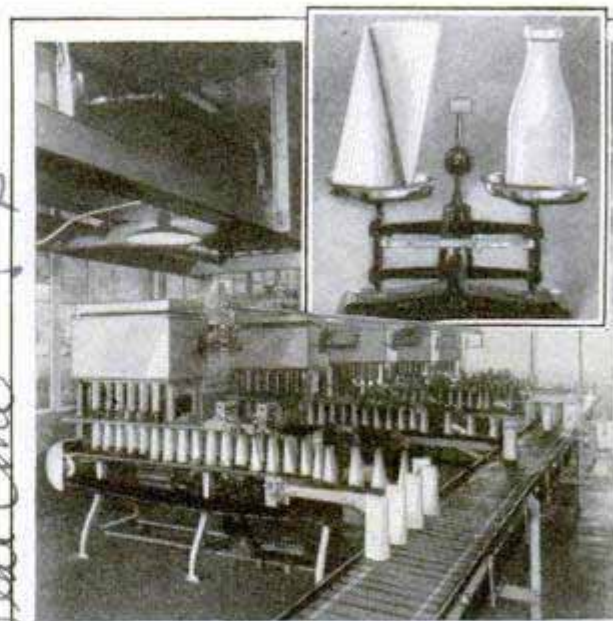
### PREDICT VOLCANO ERUPTIONS BY STUDY OF AVERAGES

When Dr. Thomas A. Jaggar, director of the Hawaiian volcano observatory, predicted, the other day, that there will be an eruption of either Kilauea or Mauna Loa this year, scientists paid attention, for his prophecies with regard to the action of volcanoes have been fulfilled with remarkable consistency in the past. "A volcano is not a clock," he explained. "The interval theory is based on averages and the averages are based on certain laws of nature such as those that determine the space intervals of ripple marks in the sands of the sea or the time intervals when they break rhythmically on the beach. The lava under a volcano has been pressing upward for ages through a crack

of certain size. It has blocked or impeded that crack with its own heap of lava and so has forced itself to adopt a rhythm or interval like the puffs from a steam engine. If it has several vents, these divide responsibility for the interval, and if one vent is low and close to the water table, while the other is high and far above the ground water on the island, the probability of explosion is greater for the lower vent. This is because a sudden drop in the lower vent may place the lava column below the water table and so develop a steam chamber. This is the situation of Kilauea as compared with Mauna Loa." Doctor Jaggar predicted in 1912 that Mauna Loa would become active before 1915. It broke out in 1914. In 1920 both Kilauea and Mauna Loa erupted, according to predictions he made in 1917.

### WOOD FIBER FOR MILK BOTTLES REPLACES GLASS

Lightweight bottles of paraffin-treated spruce fiber have been introduced as milk containers in place of the ordinary ones of glass. They eliminate the clatter, are easily opened and are tightly sealed when filled, to keep out dirt and to prevent tampering. Two of the cone-shaped holders,



Filling the Paper Bottles, and Comparison of the Weight of Two with One Glass Bottle, All Filled

filled with milk, weighed but seven ounces more than a full glass quart bottle.

Science Service News Bulletin Charles Brand, 12 Washington Ave  
White Plains, N.Y.  
409. C. 123/29

Imperial  
Bulldog  
Canada  
London  
Sept 1921

Sealed Containers Corp



2037 Mr. James H. Miller  
1906 H. St. N.W.  
Washington, D.C.

# The Bug Boarding House

**T**HE FANTASTIC sight of two chickens, each one clad in what actually looked like a nightshirt, careening about on a farmhouse lawn, was afforded two automobilists in the rural district of Vienna, Va., a short time ago.

"What does that prove?" exclaimed the astonished driver as he shut off his motor and took a closer view of the scurrying hens.

The answer, given by W. S. Abbott, was that they were now on the premises of what is probably a unique research farm in the country. Known variously as the "Bug Boarding House," "The Crawler Factory" and "The Insect Zoo," the establishment is used for the purpose of testing out all manner of chemical mixtures purported to rid the nation's households, gardens and farms of bothersome and destructive insect pests.

"Doctor" Abbott, as he is known, is the landlord of the boarding house, and he has been on the same job for about twelve years, his official title being entomologist, or insect specialist. Assisting him are three other entomologists, and the government has established a somewhat smaller bug farm at Lake Alfred, Fla., near Orlando, the idea being to study the southern insects, notably those that prey upon citrus fruits. In addition, the food, drug and insecticide administration, which supervises all the work, maintains some thirty collectors whose duty it is to tour the country in search of samples of insecticides to be turned in for investigation.

Far-fetched as the bug farm's nicknames may sound, they are not so much so when you come to examine the reasons for their origin. Certainly the place is an insect-boarding house, for there are apartment houses and a regular bill of fare for cockroaches; a two-story palace devoted exclusively to the fussy wants of clothes moths and carpet beetles, and, besides, two entire greenhouses filled with choice plants that offer the richest kind of desserts for the most discriminating outdoor moguls of bugdom.

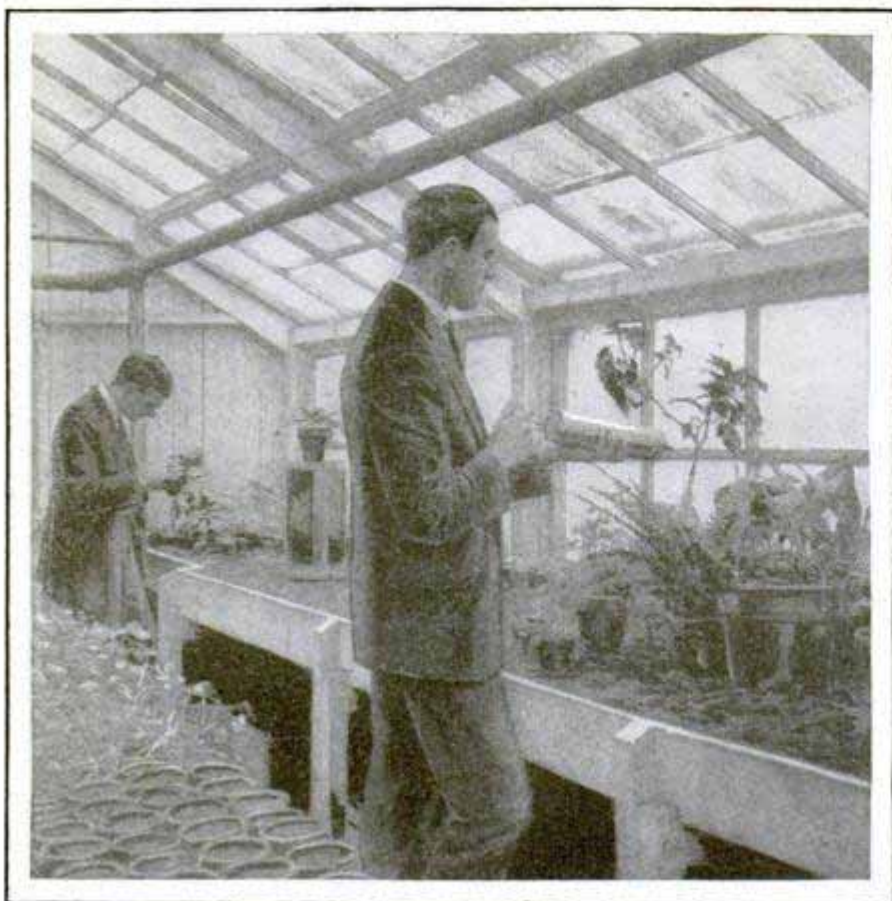
As for being a "Crawler Factory," that term, too, is not so far from the truth. There's hardly an insect that a person could name off-hand that isn't to be found, and if it so happens that the supply of roaches, moths, fleas, lice, and so on, runs low, the experts practice the simple expedient of supplying such appetizing fare that in an amazingly short time, may be only a few days, the situation becomes normal.

Then again, the name "Insect Zoo"



An "Apartment House" for Cockroaches in the Government Experimental Laboratory, Where All Kinds of Insects Are Studied





Testing Out Insect Eradicators in One of the Greenhouses of the Laboratory Where Pest Extermination Is Studied

comes pretty close to the real facts in the case. Whereas, in an animal zoological park, the monkey frolics about a tree while the duck cavorts in a pond, a similar situation prevails among the bug-farm inhabitants. Within its exclusive mansion, the cockroach may play hide and seek among the cracker boxes and refuse of various kinds that simulate almost exactly the conditions in its natural habitat; the hungry clothes moth, surrounded by a goodly supply of raw wool and woollen cloths, has far better quarters than he would have normally, and the rest of the bug family are treated with like consideration. For instance, the itinerant animal parasites, such as those fleas and lice that gnaw on dogs, cats and chickens, are bred in substantial numbers by the simple process of letting them roam around at will on the haunches of animals raised especially for the purpose.

Those two staggering hens with the "nightshirts" on were taking part in a curious test. The experts had followed out literally the directions of a lice cure, which recommended that cheesecloths, that previously had been dipped with a

certain kind of chemical mixture, be wrapped around the hens. It killed the lice, sure enough, and killed a lot of chickens, too. Almost equally tragic results, though of a somewhat different sort, have come about occasionally during experiments concerning the lowly bedbug. There was a time when the wee crawlers were bred in the bug-boarding house on a rather large scale. Not so today, however, and possibly such happenings as the following may serve to explain why. It seems that bed cooties can live on many kinds of animals, notably white rats, or so the experts believed in the early days. Therefore, in order to encourage their development,

the seemingly clever idea was hit upon to build up a sizable partnership between the bugs and rats.

All went well for a while. But soon the scientists were taxing their brains to solve the strangest mystery of many a day. The bedbugs were disappearing fast and no legitimate reason presented itself until one alert expert noticed to his astonishment that, instead of the crawlers thriving on the white mice, the latter beasties were chewing away steadily on their erstwhile biters. This sort of thing couldn't go on. So the practice of trying to breed the bedbugs stopped, and the fact was made known officially that Uncle Sam hereafter would buy them at the modest price of a penny apiece. Yet there weren't any too many bug hunters willing to sacrifice time and energy for that sum. Whereupon the price jumped up to a copper and a half. Even then the situation was hardly as it should be, although there actually were a few people of extra-fine eyesight who not only claimed they could supply 2,000 bugs upon twenty-four hours' notice, but were able to make good on the boast.



This bedbug story, however, had an unexpected ending. Doctor Abbott one day mentioned, in a Washington barber shop, that the government was in the market for a supply of the bugs at a cent and a half apiece. A stranger standing by offered to assist in getting the collection started, but his assistance took the form of passing the story on to a newspaper reporter, who wrote a highly interesting account of Uncle Sam's offer to pay for the pests. Papers throughout the country reprinted the yarn, sometimes adding embellishments of their own, with the result that large shipments began to arrive from all quarters of the country. It was necessary to get out a special form letter assuring aspiring dealers that the government did not need any more insects and would gladly return those already sent, provided the shipper sent return postage.

Not all the martyrs to science get their names in the daily press. It is all in the day's work for an insect inves-



tigator on the bug farm to be called upon, of a summer's evening, to go out in the swampy woods where mosquitoes are thickest and "park" there for hours, meantime letting the stinging insects try their luck both on an arm that has been treated with a so-called mosquito-proof lotion and on one that has no such protective substance on it. Unhappily, this procedure

has to be carried out because it is one of the best ways to test the efficacy of many much advertised commercial remedies. The idea is to compare the number of bites received on each arm.

Gas masks are common enough in mines. But who ever heard of using such protective coverings for "shooting" cats and dogs with flea and lice remedies? Nevertheless there are frequent occasions when the bug experts must put on a funny-looking mask, known as an "aspirator," that fits over the nose and mouth. Without it, they would be more than likely to get their nose and throat so filled with strong chemicals that very soon they would manifest all the symptoms of the



Trying Out Flea Cures on a Cat and Dog, and, Center, a Plant Ravished by Aphids About to Be Sprayed





Chickens Wear "Nightshirts" in a Test in Which the Garment Is Saturated with an Advertised "Remedy"

true possessor of hay fever. It seems rather a shame that no such contraption has been devised for the use of the animals that must undergo the tests, but thus far there has been none that has entered the situation seriously.

The dog shown with "Doc" Abbott in the picture, is only a mongrel. But its service to science during its five-year stay with Uncle Sam has been important. Sad-eyed and quiet, it has figured in all sorts of tests. In one of the very latest, it was adorned liberally with fleas, wrapped carefully within a piece of sacking and then put into a box sprayed with a new kind of flea cure. Only the faithful dog's head was left sticking out and it presented an exceedingly sorry picture. However, it bore the ordeal with bravery and earned further high rank as a star boarder in the bug house. In this regard the cat family is far more "persnickety" than are the dogs. Five kitties are kept at the farm to be covered now and again with sundry fleas and lice closely related to the dog varieties. But, as every one knows, cats bitterly resent having any kind of liquid poured on them; which explains why only

the powders are used ordinarily. Even these are not welcomed.

Lice aren't by any means confined to animals. Plants have them, too, and in great abundance, variety and in most colors of the rainbow. Known as aphids, the size of these strange insects also varies widely, some being so tiny as to be barely distinguishable to the naked eye, and others up to about an eighth of an inch long. Though most aphids are green, the color seems to depend mainly on that of the particular plant on which they live.

One of the most novel of the recent experiments at the bug-boarding house was designed to test the effect of a substance, to be taken internally, which would not only rid chickens of lice, but, in case the said poultry were gobbled up by hawks or owls, would likewise kill these animals. The experts gathered a few of these last and fed a couple of chickens to them after the latter had imbibed of the magical powder. But something revolutionary must have happened to the "remedy," for the hawks and owls seemed to thrive on their unusual fare even when the powder dose was increased up to eight times the amount called for.

## BOAT FOR SHALLOW WATERS HAS "STEPS" ON KEEL

Weighing slightly more than 180 pounds, an outboard-motor boat introduced in England, will run on water but three inches deep when it is empty. The keel is arranged with overlapping members and the sides are built in the same manner to decrease resistance from the water when the craft is going forward. It will hold several persons.

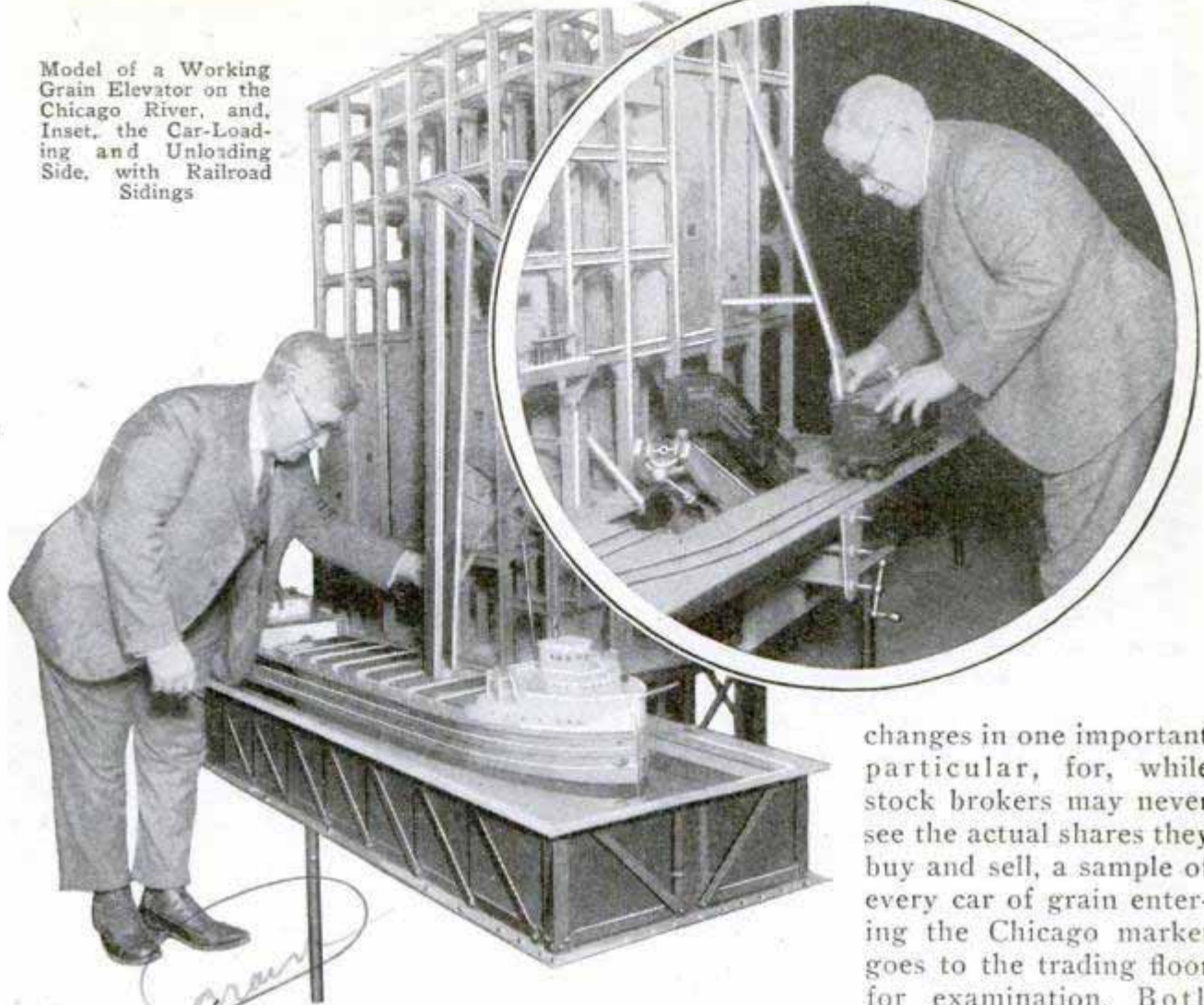


View of Keel of the Outboard-Motor Boat, Showing the Overlapping Members on Bottom and Sides

*British Power Boat Co.,  
London, England*



Model of a Working Grain Elevator on the Chicago River, and, Inset, the Car-Loading and Unloading Side, with Railroad Sidings



## MODEL ELEVATOR LOADS CARS AND LAKE STEAMSHIPS

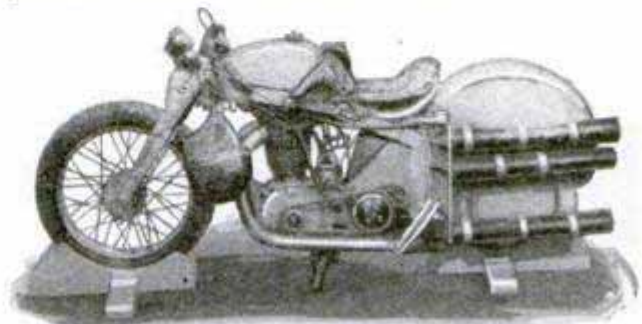
The millions of bushels of grain which each year pass through the control of the world's greatest grain market, the Chicago Board of Trade, require a vast amount of handling machinery to permit weighing, checking and speedy shipment. The huge grain elevators can load or unload either railroad cars or lake steamships at the same time, and weigh every bushel of grain that goes in or out of the bins, all in one operation. One of the sights of the weighmaster's office is a scale model of an elevator, rail car and steamship, cut away to show actual operation. Grain can be run into and out of the bins, and to and from the car or steamer holds, and accurately weighed as it passes. The unloading of railroad cars is accomplished on a dumping track, similar to those used to empty coal cars. The Board of Trade differs from stock ex-

changes in one important particular, for, while stock brokers may never see the actual shares they buy and sell, a sample of every car of grain entering the Chicago market goes to the trading floor for examination. Both

Board of Trade and state inspectors pass on the grading and insure the genuineness of the sample as representative of the lot.

## MOTORCYCLE RUN BY ROCKETS SHOWN AT EXHIBITION

One of the interesting displays at a recent motor exhibition in Germany was a rocket motorcycle. For the first time, the general public had an opportunity to examine this unit closely. The cycle has passed several successful tests.

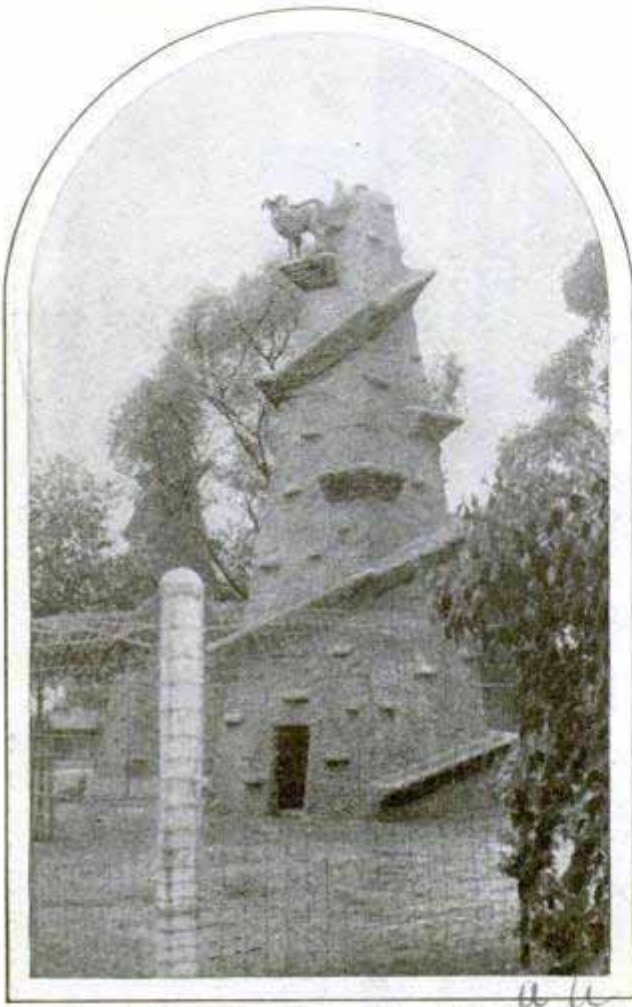


Rocket Motorcycle Shown at German Exhibition; Note Chambers and Powder Containers at Rear

Abel Co. Russell & Co.



## ZOO GOATS' MODEL MOUNTAIN KEEPS ANIMALS IN TRIM



Goats in the San Diego Zoo on Top of Their Artificial-Mountain Playground Erected in Pen

To give mountain goats the exercise they need, an artificial cliff has been erected in the animals' pen at the Balboa park zoo in San Diego, Calif. A spiral runway leads to the top of the crag, and there are projections to which the animals may jump. The goats enjoy the climbing and their nimbleness attracts visitors.

## SOLVE RADIO MYSTERY 2093

While stirring beans on her electrical stove, a California woman was mystified at hearing the strains of three musical selections coming from under the pan. The phenomenon remained a mystery until investigation led to the following explanation: The music was picked up by induction from a telephone wire by the current circuit that supplied the range. It was then fed to the metal resistances in the stove where the audio vibrations were loaded upon the heat vibrations

which carried them to the thin metal disk of the pan. The stirring caused the musical vibrations to come up from under the beans. It would have been possible, in the opinion of engineers, for the hot air alone to have reproduced the music.

## LIGHT RAYS CONTROL TRAIN TO PREVENT WRECKS

German engineers are testing a light-ray safety-control system for railroads. A selenium cell is an important unit in the apparatus and along the right of way are mirrors, of special construction and said to be reliable under all weather conditions. Rays emanating from the locomotive cab strike the mirrors as the train proceeds. If there is danger ahead or the next block is closed, the rays affect the selenium cell in such a way that an electric circuit is closed and the train's brakes are automatically applied. The train is brought to a stop gradually by varying the distance between the mirrors. The system has been recommended for installation at curves and other places where slower speeds are in keeping with greater safety.

## PUNCHING BAG WORN ON HEAD AIDS SHADOW BOXER 2048

As a substitute for the regulation punching bag, a rubber sphere, attached to a headband by rubber cords, and worn in front where it can be struck by the fists, has appeared on the market. It is said to afford healthful exercise, gives practice in shadow boxing and is noiseless. Should the user miss the ball, he would suffer no injury as the sphere is of light weight.



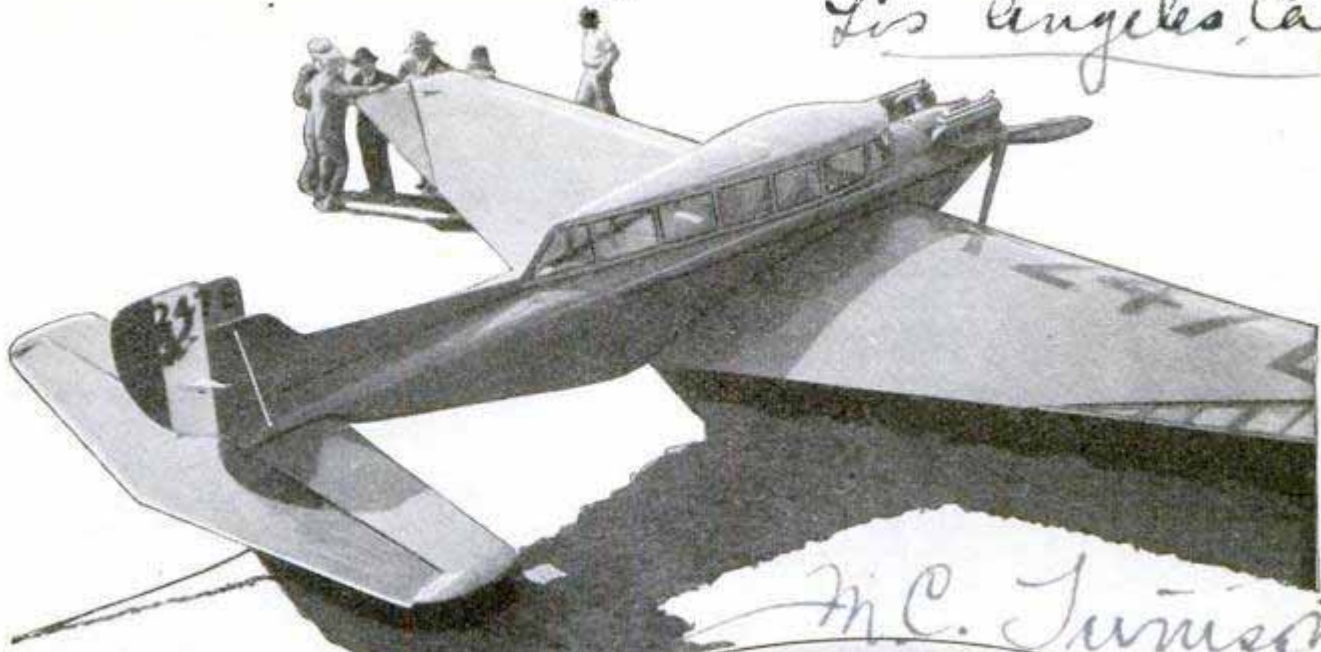
Shadow-Boxing Practice with Lightweight Rubber Ball Attached to Head with Rubber Band

St. Joseph News Press  
12/26/28

Monaco Co.  
Haven Conn.



# ALL-STREAMLINE PLANE FLIES AT GREAT SPEED



Interesting Views of the Stream-line Plane Built for Fast Speed and Greater Comfort; Note the Guards about Landing Wheels

Absence of struts, unusual development of streamline design and the low position of the wing are special features of a monoplane built by a western engineer. It has flown at 200 miles an hour with its single motor and has climbed to a height of 1,000 feet within the first minute after leaving the ground, according to reports. Landings at forty miles an hour are made. The fuselage and wing are covered with plywood. The plane has a wing spread of thirty-five feet.

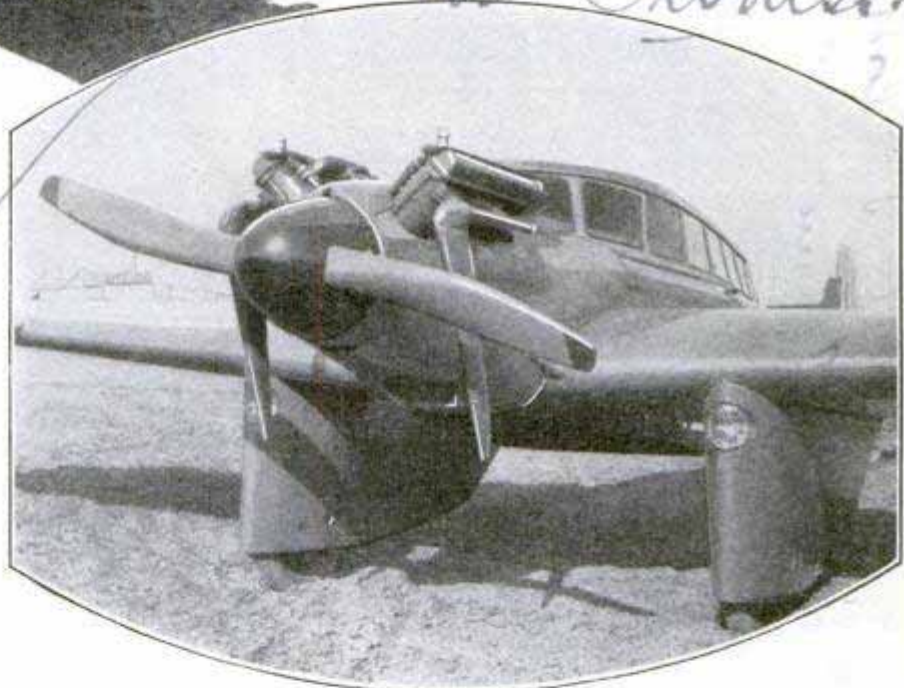
2120

## "COLDEST SPOT IN THE WORLD" FOUND AT HELIUM PLANT

Near Amarillo, Tex., the bureau of mines is constructing a plant for obtaining helium from natural gas and when it is in operation, it will be one of the world's coldest places. Three hundred degrees below zero will be the normal "weather" in this laboratory, for at that point other substances than helium in the gas are liquefied and can be drawn off, leaving the helium, which is carefully saved and bot-

tled for use in inflating airships. Under such cold, air is also liquefied, carbon dioxide becomes solid, lead and copper take on the properties of steel, and rubber becomes as brittle as glass. An icicle, thrust into the gas at such a temperature, would produce about the same effect as when a hot poker is immersed in water. Improved manufacturing processes are reducing the cost of helium to but a fraction of what it was when the gas was first employed for aeronautical purposes.

Names and addresses of manufacturers of articles described in this magazine will be promptly furnished, free, by our Bureau of Information.



M.C. Twiss

*Twiss Airplane Co. Malden, Mass.*

*Oklahoma Times*



207  
632  
Aer. Currier

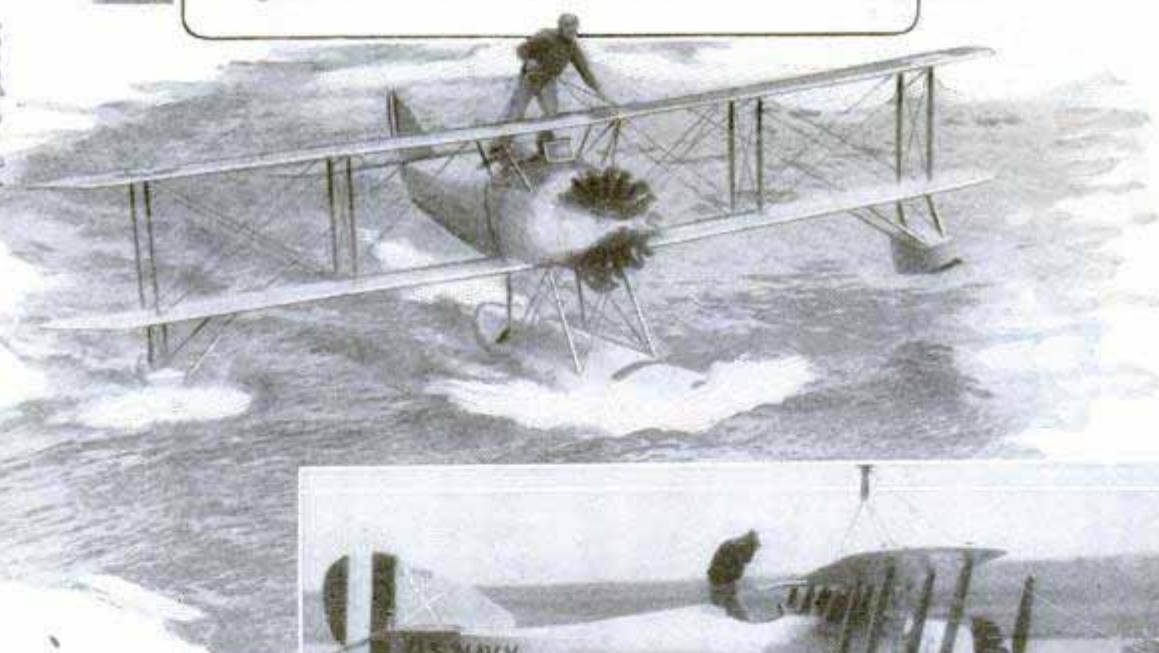
506 Sprickels Bldg

POPULAR MECHANICS  
San Diego Calif  
SEAGOING FLYING FIELDS AND SALT-WATER

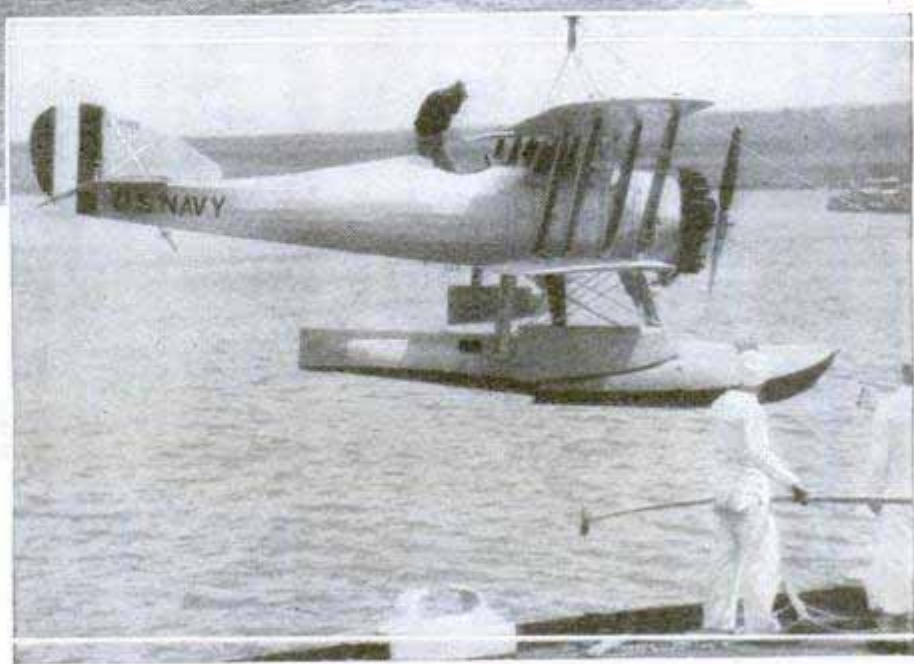
Martin torpedo - Glenn L. Martin Co,  
16800 St Clair  
An Cleveland, Ohio



Ready to Take Off from the Flying Deck of the "Lexington," One of Uncle Sam's Newest Aircraft Carriers

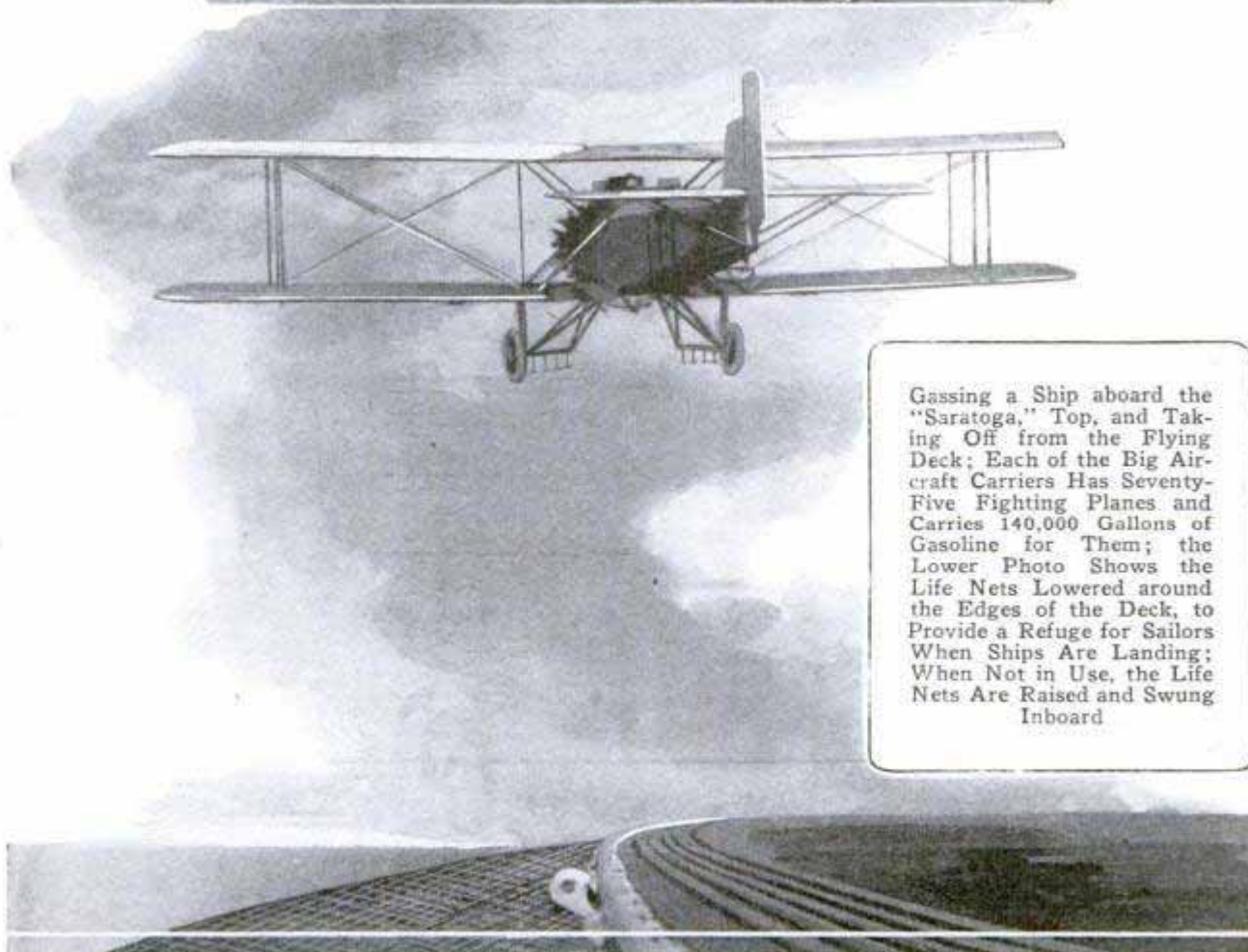
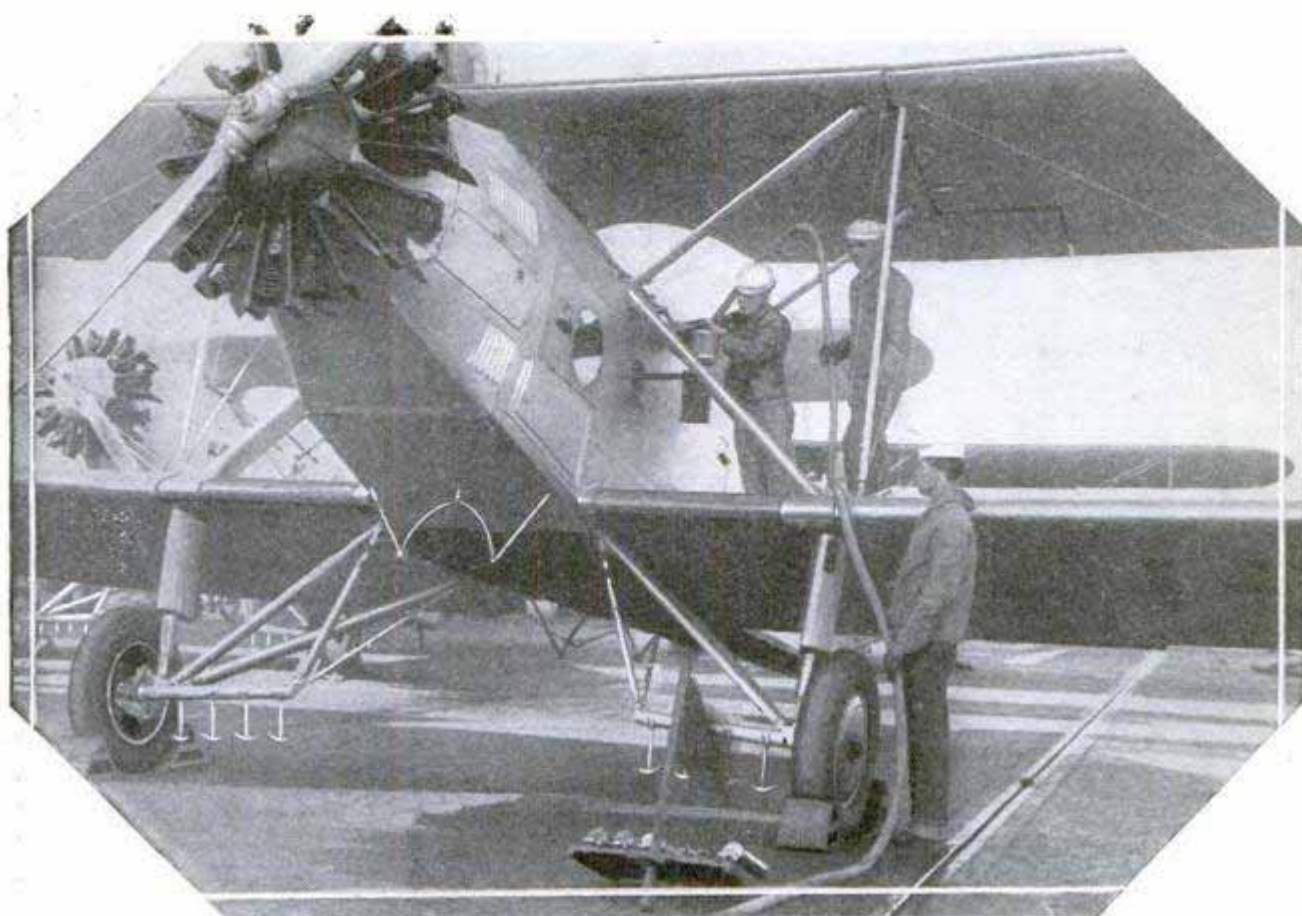


Landing a Seaplane Along-side Ready to Be Hauled Aboard Again, and the Plane Being Hoisted to the Deck; Seaplanes Are Shot from the Carriers, as Well as from Battleships and Cruisers, by Catapults, and When They Return Alight Along-side in the Water; Land Ships, However, Can Fly Directly from the Broad Flying Deck and Return to It, Hooks beneath the Landing Gear Engaging Arresting Apparatus to Bring Them to a Stop





## AIRMEN WITH THE FIRST LINE OF DEFENSE

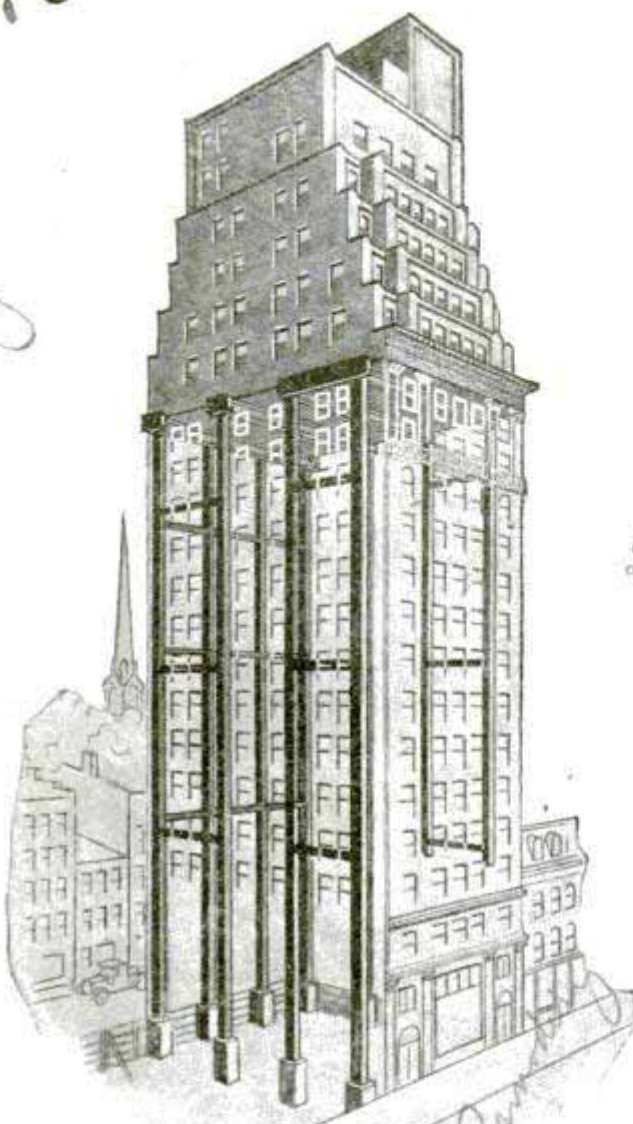


Gassing a Ship aboard the "Saratoga," Top, and Taking Off from the Flying Deck; Each of the Big Aircraft Carriers Has Seventy-Five Fighting Planes and Carries 140,000 Gallons of Gasoline for Them; the Lower Photo Shows the Life Nets Lowered around the Edges of the Deck, to Provide a Refuge for Sailors When Ships Are Landing; When Not in Use, the Life Nets Are Raised and Swung Inboard



2086

at 7-11 E 40th St. New York



Drawing to Show How Stilts Were Installed in Building and Addition Erected on Top of Them

### ADD STILTS TO OLD BUILDING FOR EXTRA STORIES

Although it was not constructed for adding more floors, an office building in New York city was raised six stories recently by a skillful engineering plan. This involved erecting eight columns, 175 feet tall, inside of the old building, to support the addition. The work was accomplished without disturbing tenants and was finished within six months.

### NEW VISUAL THEORY OFFERED BY SIR OLIVER LODGE

How do we see? The phenomenon of vision is given a different explanation by Sir Oliver Lodge who witnessed a series of tests showing the effect of electric shocks on the nervous system. He suggested that radiation alone is not the

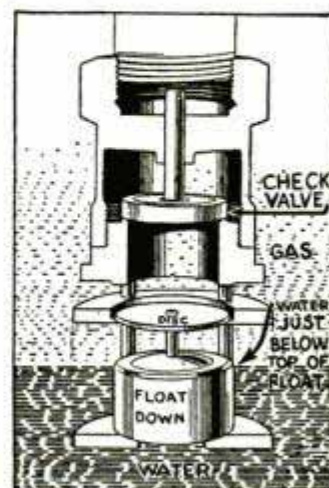
whole cause of vision but that the retina of the eye possibly contains something which ejects electrons and these act as projectors to stimulate the nerves. This stimulation from the electrons, rather than the impact of the light waves, Sir Oliver holds, may cause vision. His explanation was inspired by the fact that some high-frequency electric currents could not be felt when applied to the body of the subject in the test, but did produce an effect on the nervous system.

### PRINTER'S ERROR ADDS VALUE TO POSTAGE STAMP

Mistakes usually are costly but they may mean small fortunes to stamp collectors. An illustration is furnished from France. Recently, a government printer carelessly tore a roll of blank paper on which the stamps were to be printed. He mended it with a strip of red paper. When the stamps, which were printed in green, were finished, ten of them appeared on a red background. They are already highly valued by collectors and doubtless will increase in price.

### WATER KEPT FROM GASOLINE BY SAFETY VALVE

To prevent pumping water into the automobile gasoline tanks from filling stations, a special valve has been devised to fit on the end of the suction line inside the station tank. Its essential feature is a float which sinks in gasoline but rests on water and locks the pump before water at the bottom of the tank can be drawn into the customer's auto. The station attendant can quickly pump out the water in the tank, thus allowing the float in the suction-line valve to fall back and unlock the gasoline pump. Rust, dirt and scale in the bottom of the tank are also excluded by the valve, which is made of bronze.

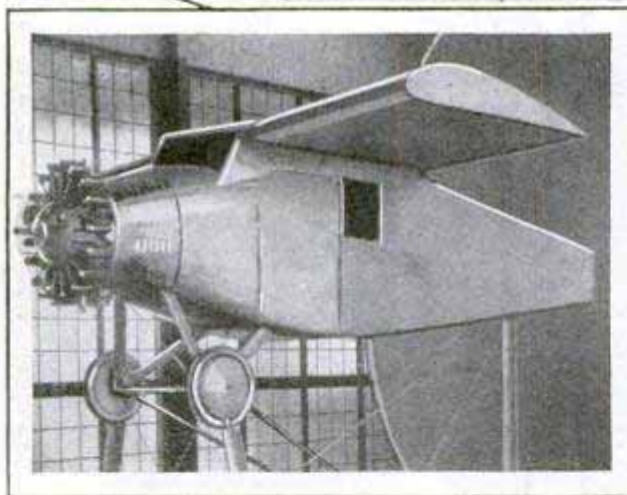
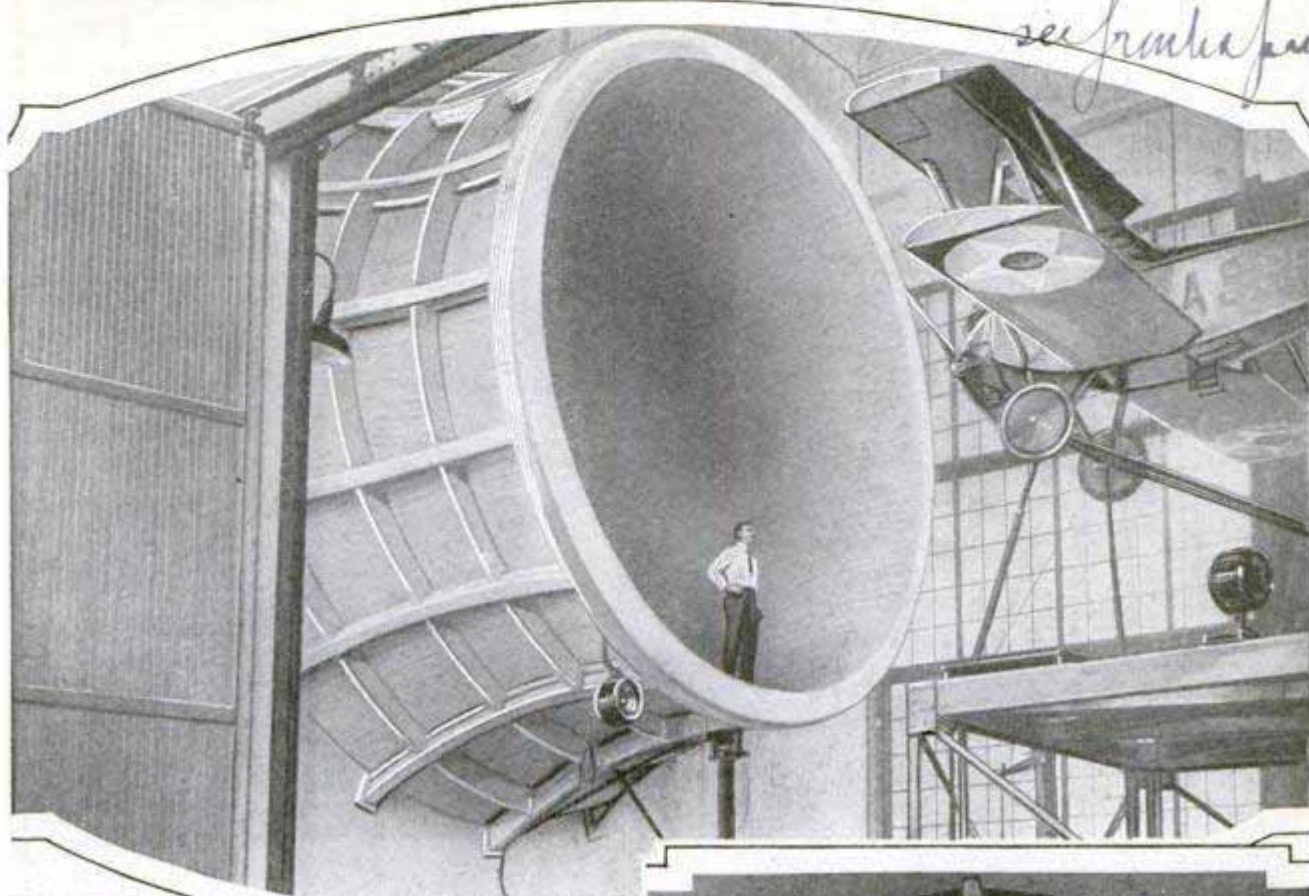


Com. H. J. Williams, Esq.

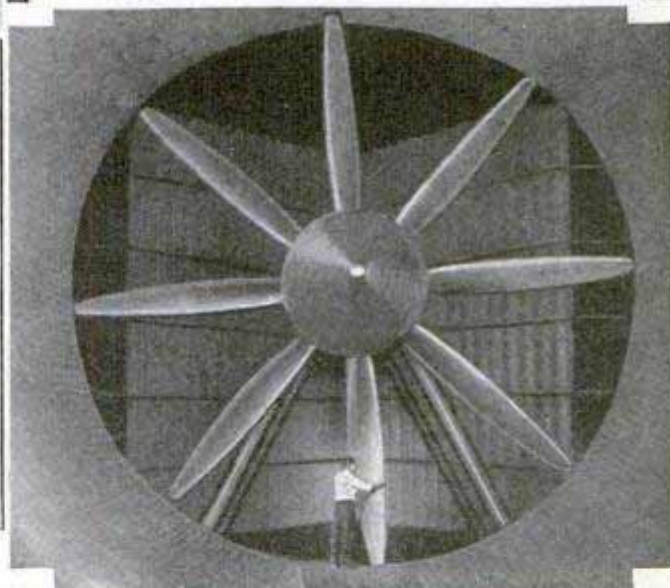
Swift Lubricator Co



WHERE LATEST DESIGNS IN PLANES ARE TESTED



Views in the Plane-Testing Laboratory at Langley Field; the Huge Wind Tunnel, One of the Planes Tested and the Large Fan



Unusual experiments that will have a far-reaching effect on airplane design are being conducted at Langley field, Va. The air resistance of the increasingly popular radial air-cooled aviation motor, which now is one of the most serious drawbacks of this type of airplane power plant, is reduced by more than thirty per cent by a radical change in streamlining the cowling, which diverts the propeller slip stream around the motor and yet does not interfere with the cooling. The in-

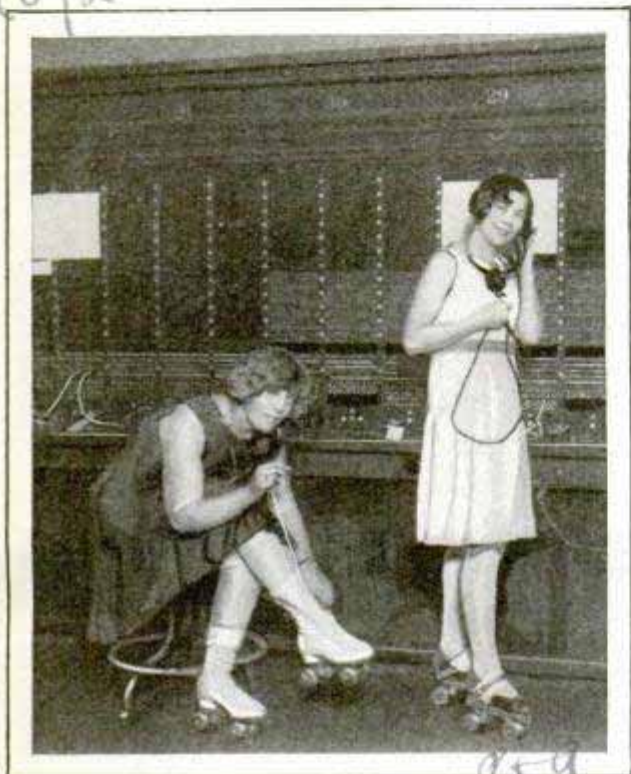
crease in efficiency resulting from this change is said to be the most valuable aviation improvement since the World War. Wind-tunnel investigations have revealed that twenty-five horsepower is lost in overcoming the wind resistance offered by the motor, without streamlining. Therefore, the new cowling increases the effective horsepower of the plane by approximately eight horsepower. The saving, in the case of a 200-horsepower motor, for example, amounts to

Laboratory National Advisory



three gallons of gasoline to the hour of flight. The new cowling device, which resembles a large bowl with the bottom knocked out to make room for the propeller shaft, is placed over the engine. It is the first result of a cowling and cooling investigation undertaken in the new \$150,000 propeller-research tunnel.

## ROLLER SKATES SPEED PHONES IN EARLY HOURS



Telephone Girls in Los Angeles Exchange Wearing Roller Skates to Save Time in Answering Calls

Young women on duty in the early morning hours at a Los Angeles telephone exchange, wear roller skates to speed them in moving to different positions at the boards. The plan is reported to have been successful, as it saves time when only a few attendants are at work.

## ANCIENT BURIAL PIT REVEALS ROYAL SPLendor

Splendors of a royal court that flourished 5,000 years ago have been unearthed in the cemetery of Ur of the Chaldees, where the bodies of forty-five sacrificial victims, thirty-nine of them women, have been found by excavators. The discovery revealed an amazing display. There were gold hair ribbons, wreaths of gold leaves

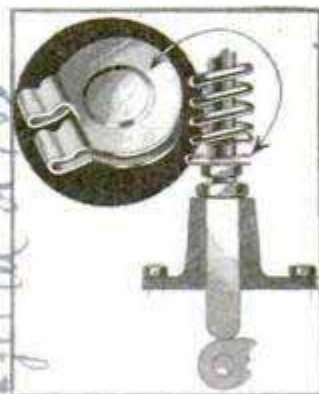
and flowers, inlaid pendants, large ear rings, combs with flowers of colored inlay, pins and necklaces of gold. Among other objects were three harps, one adorned with the golden head of a bull, and the statues of a pair of rams, their heads and legs of gold, the horns and hair of lapis lazuli and the fleece of white shell. The statues have sockets which indicate that they once were the support of some article of furniture or ornament that long since has disappeared. After the bodies of the sacrificial victims had been placed in the pit, earth had been heaped on them and tamped down, while other possessions, servants and live stock were buried to complete the ceremony.

## MAGIC EFFECT OF COLOR KEEPS STEEL COOL

That color may be employed indirectly to increase the strength of some structures is the interesting conclusion suggested by a series of experiments by an English authority. He has found that a certain shade of blue diminishes the effect of the sun's rays on steel and preserves a more even temperature. Since extreme heating and cooling may tend to weaken a structure, under certain conditions, the proper color might insure longer life and greater strength. Physicians long have recognized the importance of the right color in hospitals and sick rooms and in the home, the use of color in decorations being studied more carefully.

## SPRING CLIP FOR VALVE TAPPET ELIMINATES NOISE

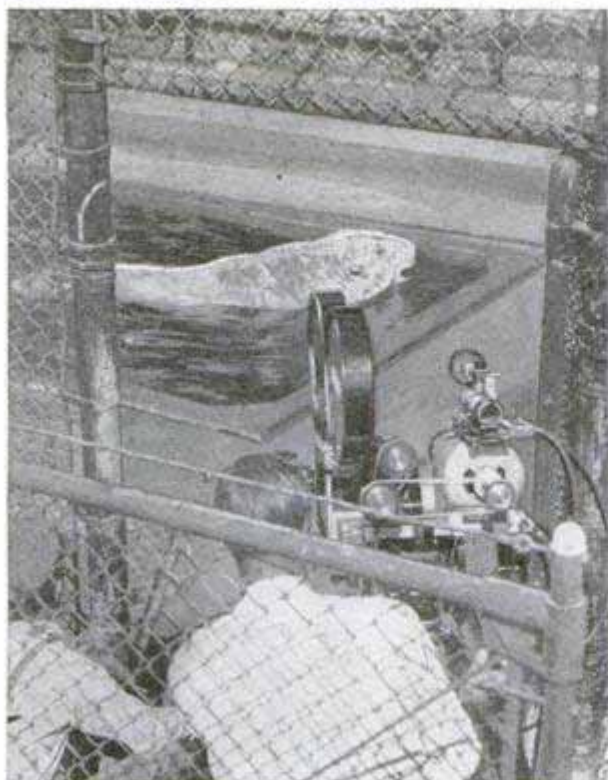
To stop tappet noises in cars which have developed that trouble, a spring-steel unit is inserted between the valve stem and the tappet head. Once in place, it holds the tappet in constant engagement with the camshaft and few minutes.



Science Service, Bulletin #

492-9 121/20





Polar Bear Performs for the "Talkies"; the Recording Apparatus Was Placed at the Open Door of the Bear's Cage While the "Mike" Was Held near the Screen

## POLAR BEAR IN TALKING MOVIES PROVES GOOD "ACTOR"

To obtain "talking" moving pictures of a polar bear at the zoo in Oakland, Calif., photographers placed their machines close to the animal's cage and then opened the door so they could film close-ups of the inmate. The bear seemed to enjoy its brief experience as an "actor," jumping in and out of its pool and giving a few roars and grunts which were recorded for the talkies.

## MOON LIKE VOLCANIC ASHES TEMPERATURES SHOW

No one knows for sure of what the moon is made, but temperature tests during the last eclipse indicate that it is composed of a porous substance possibly not unlike the volcanic ashes common in various parts of our earth. Scientists are quite certain that the moon is not like solid rock in structure. Drs. Edison Pettit and S. B. Nicholson, of the Mt. Wilson observatory, made careful measurements of the cooling of the moon as it went into the earth's shadow. Similar measurements were made in a laboratory as to the cooling of substances such as granite, ba-

salt and quartz. The material that cooled in a manner most like that of the moon was pumice, a porous stone of volcanic origin. The tests further substantiate the theory that the craters on the moon were caused by volcanoes.

## PAPER-COVERED FOOTRESTS AID SHOE-STORE CUSTOMERS

One of the latest conveniences for the shoe store is a footrest with a reel of paper that is unwound as needed to provide a fresh, clean surface for the patron's stockinged feet. The reel carries sufficient paper for many days, and the stool is of such shape and size as to be handy and comfortable.



☐The Popular Mechanics' Bureau of Information offers its free service to all readers of this magazine. Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be promptly furnished.

*Yok. Am. Shie. Lakewood.*

*W. J. (Rev. 1140*



1748

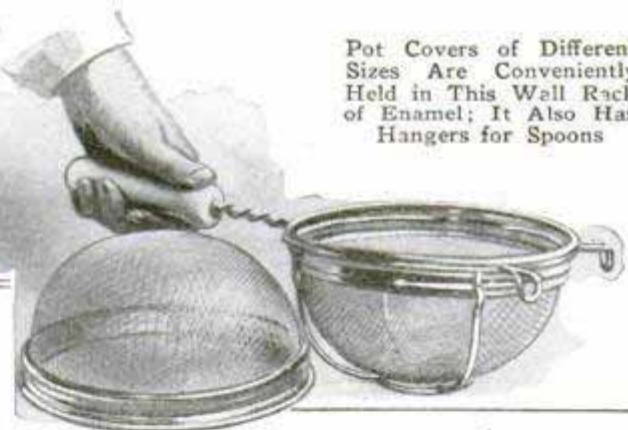
# New Ways to Avoid



Small Electric Range and Broiler Combined Takes Anything Up to an Eight-Pound Roast, Reduces Current Consumption and Saves Time; the Top Part Has a Three-Compartment Steamer for Vegetables

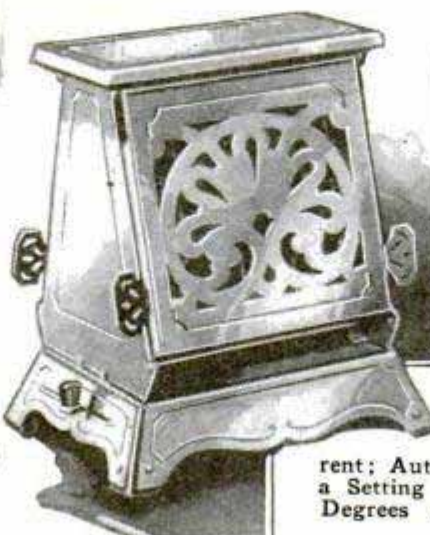


Pot Covers of Different Sizes Are Conveniently Held in This Wall Rack of Enamel; It Also Has Hangers for Spoons



Extra Service Is Rendered by This Double Strainer with Two Sieves; They Come Apart without Difficulty for Washing

This Portable Gasoline Heater Can Be Swung at Different Angles for Better Direction of Its Warmth; It Is Safe and Simple



To Prevent Burning of Toast and to Save Current; Automatic Electric Toaster Has a Setting Device for Giving Different Degrees of Brownness, and Turns Itself Off





1748

# Home Drudgery

S.  
H.  
D.

Small Electric Washer Can Be Installed beside the Washbowl in Bathroom, or Other Convenient Place; Cleanses All Sorts of Garments and Will Take Bulky Articles Like Sheets and Pillow Cases



Mop Wrung by Crank Instead of in the Usual Way Has a Mechanical Hand That Holds the Cloth Flat against Floor Surface When in Use



Washing Dishes without a Pan: This Handy Mop Has Space for Soap in the Base of Its Grip and Uses Odd Pieces to Reduce Waste







## SAFETY WHEELS FOR MOTOR BUS AID IN BLOW-OUTS

Small emergency wheels with solid tires are attached inside the regular wheels on motor busses of a western line. Should the tires blow out, the smaller wheels would support the load until the bus could be halted and repairs made, thus reducing the likelihood of overturning on curves or while running at high speed. The wheels can be attached in a few moments.

12/12/20

In an article on "Women of the Air" in the January issue reference was made to Glenn Curtiss as the inventor of the aileron, thereby doing an unintentional injustice to Dr. William W. Christmas, of New York, who was the first man, after the Wright brothers, to fly a plane, and who invented the form of aileron now universally used, as a movable section of the main wing. The error was due to a mistaken understanding that the Curtiss plane, with interplane flaps, which he flew on June 26, 1909, was the first practical ship to get away from the Wright system of wing warping. A search of the records since discloses that Doctor Christmas used ailerons on a plane which he flew March 8, 1908, and that these ailerons closely resembled the modern article, the patent on which he sold to the United States government.

Predictions of insect-pest invasions may be broadcast like the weather forecasts, if plans being developed by Roy Melvin, at the Iowa State college, materialize. By careful observation of the temperatures during the winter, measurements of the amount of oxygen consumed by the eggs and larvæ of insects in the cold season and comparing these factors, he has worked out a method of calculating the percentage of insects likely to survive the winter. Last year his forecasts on the abundance of corn borers were verified later in the season.

A device which makes it as easy to keep a movie camera, or any type of ordinary film or plate camera, in accurate focus on a moving object as it is to do it with a focal-plane shutter camera, is now available for amateur photographers. It consists of a fast lens and shutter, fixed in a micrometer mount and focusing on a prism, on which the picture can be seen through a magnifying eyepiece which enlarges it about ten times. A train of gears can be added to automatically keep the camera lens in the same focus or, for slower work, the device can be focused, the exact distance to the object read from a scale, and the camera lens focused to the



same point. A micrometer adjustment permits movement of the prism toward or away from the lens, so that it is possible to match the exact distance between the camera lens and the film plane, and then use it to

check other lenses to the camera, as the lens of the device is easily removed to set other lenses, such as a telephoto, in its place for accurate focusing.

❏ Reindeer were imported to America as early as 1892.



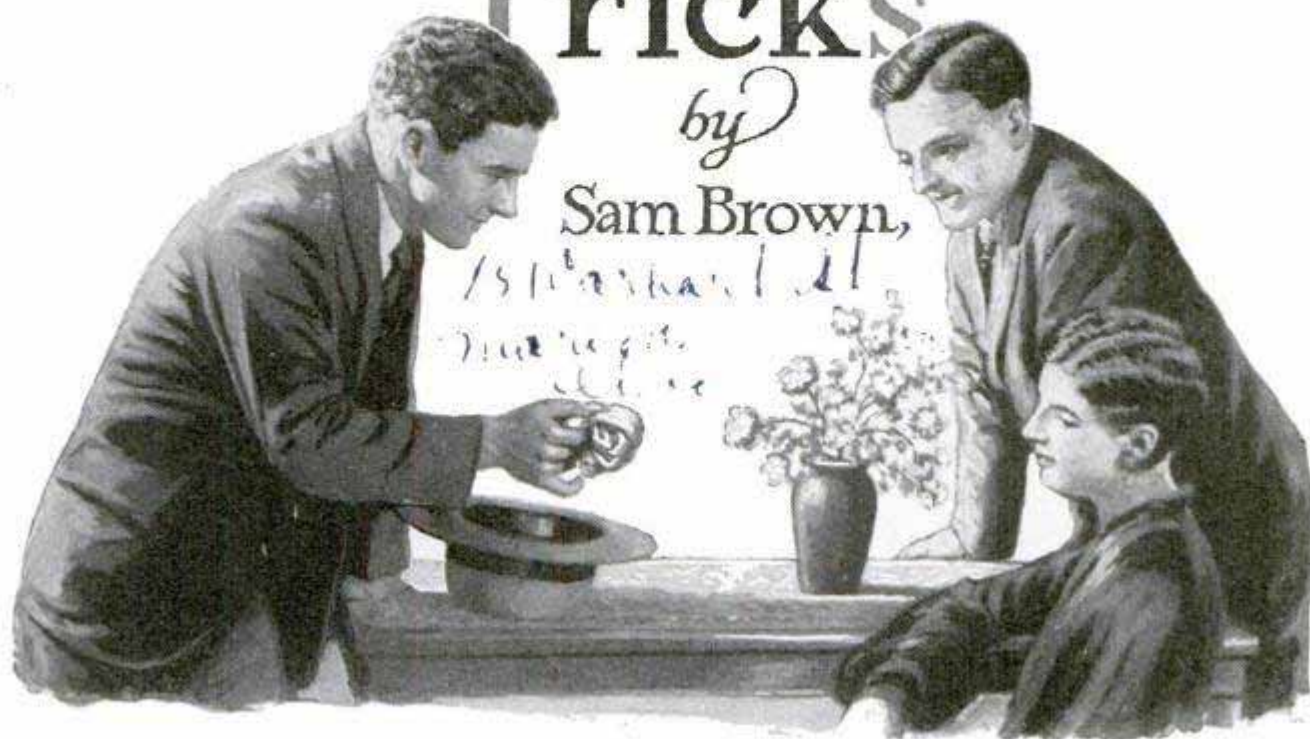
# Easy Handkerchief Tricks

by

Sam Brown,

1510 Broadway

New York City



**I** KNOW, Amos; most people think that handkerchiefs have no other business than noses, but listen.

The performer collects all the handkerchiefs present. We'll say there are four. He drops them into his hat. He shakes them up. Then comes the trick. Without even as much as a single glance, the

performer removes each person's "hanky" as he calls for it.

Isn't that a lot more mysterious than noses? And it's dead easy. The first handkerchief is gripped through the felt; the second one is pushed up under the lining; the third is the performer's own, rolled into a compact little ball so as to be



The Stretched Handkerchief Makes Big Ones Out of Little Ones, and, Top, Any Owner Can Get His Property Returned from the Hat without the Performer Even Looking at It

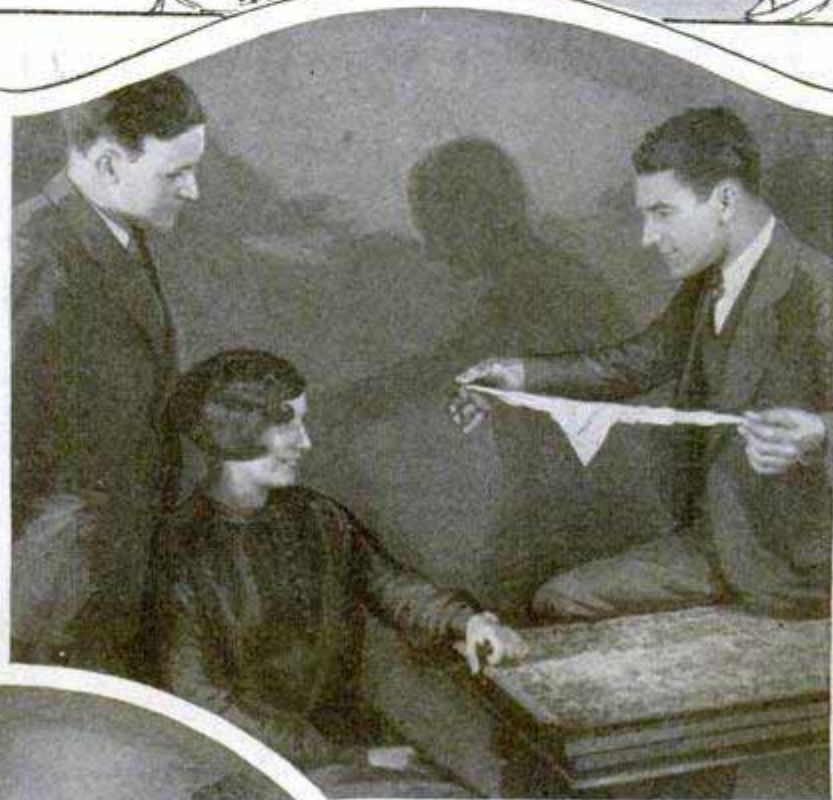
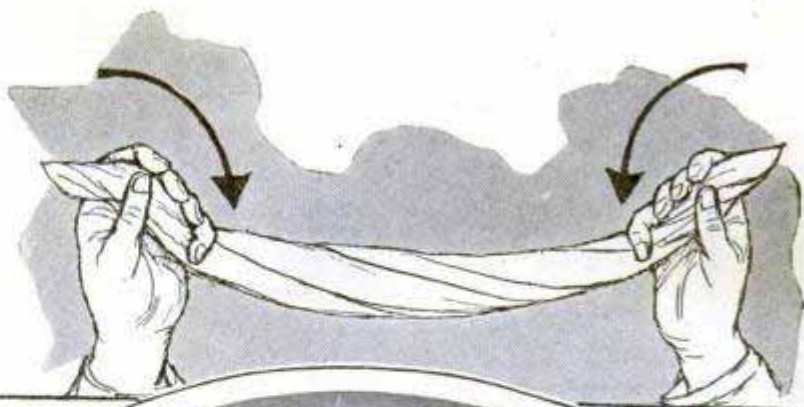


distinguishable from the others; the fourth is simply dropped in. Well, with a layout like that, all the performer need do is remember which hanky is which and distribute them accordingly.

"Rudy" Kipling tells us how the elephant got his trunk, but he gives no recipe for making big handkerchiefs out of little ones. Allow me.

The performer borrows a handkerchief. Remarking that it seems a bit small, he twists it tightly—rope fashion—between his hands. In full view, the little hanky stretches out and becomes a full-sized handkerchief for the benefit of an amused audience.

It's done like this: The handkerchief is first taken by the extreme ends between finger and thumb of either hand. It is held slack. The performer then twists it up

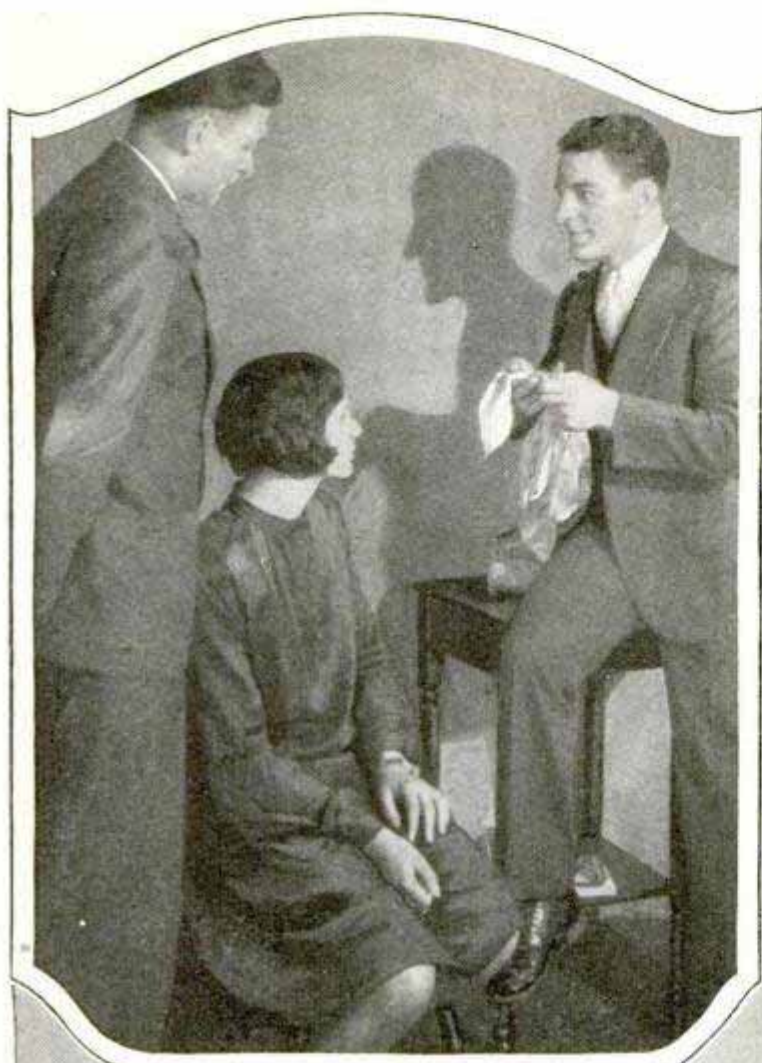


into a rope, and under cover of the rapid movement, the hands are for a moment turned backs downward, so that the handkerchief lies across the hands. The little fingers at once curl inward, as shown, and the hands are again turned backs upward. And what have you? The handkerchief now lies with a doubled-up portion of the ends concealed in either hand, although its appearance is much the same as it was before.

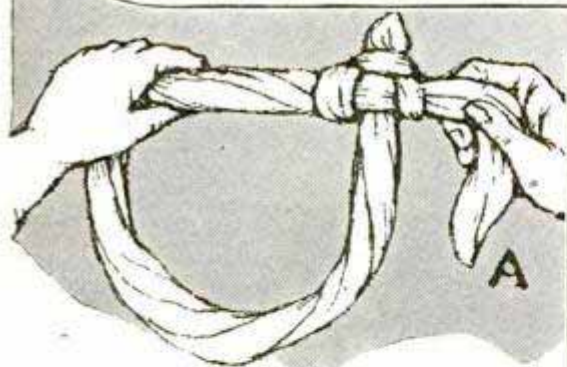
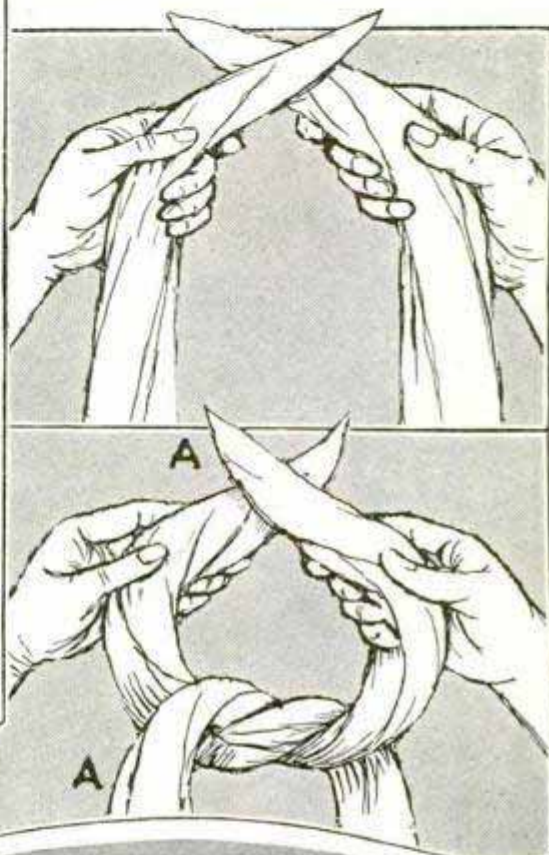
To stretch the handkerchief, the twisting is carried on, and during

Two Stages of the Stretched-Handkerchief Trick, at the Top, and, Bottom, Trying to Burn a Bit of Fireproofed Linen





magician. He previously soaks his handkerchief in a concentrated solution of borax and water. Such a hanky appears much the same as every other with the exception that it is quite some little salamander, and



The Reef Knot, an Interesting Illusion Which Can Be Performed with a Borrowed Muffler; the Drawings Show Various Stages in the Tying of the Apparently Intricate Knot, Which Then Dissolves at a Tug

the twisting the spare part of the hanky is allowed to escape little by little, first from one hand and then from the other, until the man-sized product is exposed to view.

Try this: Light a match and hold it under a handkerchief for half a minute. What happens? Well, most people have to buy a new handkerchief. but not the

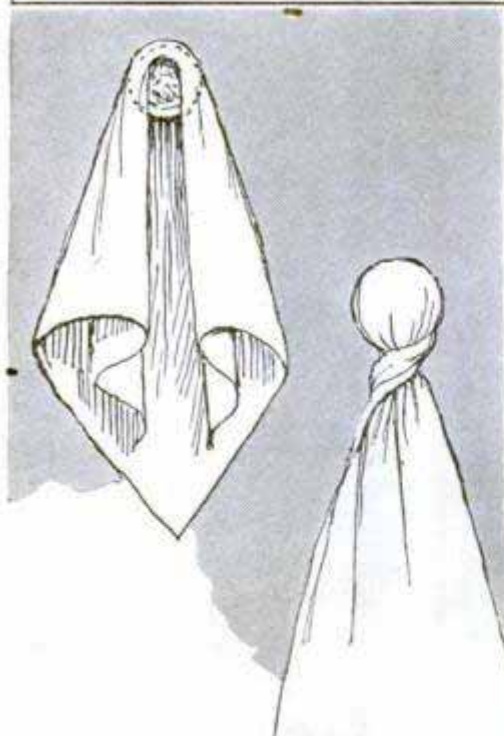






not! For the performer simply passes the silk square behind his back and the knots obligingly melt away!

A knot, called a reef knot, is at the bottom of the whole business. Like this: The first knot



doesn't seem to mind exposure to a match flame the least little bit.

The performer takes someone's beautiful silk muffler, and ties the ends tightly into knots. Gr-r-rr! Does the owner of the muffler get mad? He does



The Penetrating Coin, Which Apparently Passes Right through a Twisted Handkerchief; the Sketches Show the Working of the Trick, and the Circle Inset, the Right Thumb Making the Double Fold

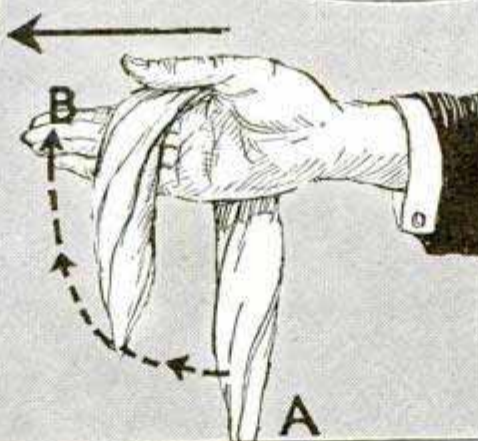
is made by passing the end of the handkerchief in your right hand behind the opposite end held in the left hand, as shown. In making the second knot, the end in the right hand is passed in front of the opposite end in the left hand, as illus-



trated. Such a knot looks discouragingly wrapped up in itself, but if you will take the two ends AA and pull, you will get the reef-knot effect as pictured. In this form, the



The Final Step in the Penetrating-Coin Trick, Top, Right; the Juggling Trick, Above, and, at the Right and Below, the One-Hand Knot, Tied by Flipping the Hand



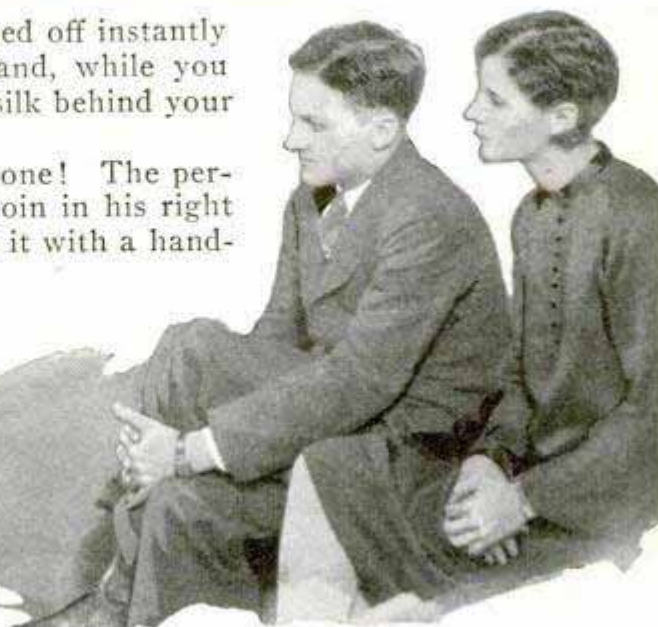
kerchief. The coin is then twisted tightly within the hanky, but, no, the magician pulls it right out again!

Do it this way: Hold the coin in your right hand at the tips of the thumb and first



knot can be slipped off instantly and with one hand, while you are holding the silk behind your back.

Here's a good one! The performer takes a coin in his right hand and covers it with a hand-





finger. Cover it with the handkerchief. Then, to show that the coin is still there, you stretch the hanky tightly over it, using the thumb and first finger of the left hand, as shown in the back view. And therein lies the whole trick. Notice that the thumb of the right hand passes over the left-hand thumb, and then grips the coin through the fold.

Not satisfied yet, the performer lifts up the corner of the handkerchief next to the audience and shows the coin still underneath the cloth. And now, with a quick flourish, the performer shakes out the handkerchief, still retaining his grip on the coin. This brings the coin to the outside of the now diagonally folded handkerchief, as shown. It is wrapped up in this condition and then removed by simply untwisting the handkerchief and sliding the coin out into view. Try it!

Balancing a handkerchief upright on

your hand is a smart juggle which is quite puzzling. Of course, your audience is unaware that you have twisted a stiff piece of fine wire inside the handkerchief to give it the necessary rigidity to sustain its own weight.

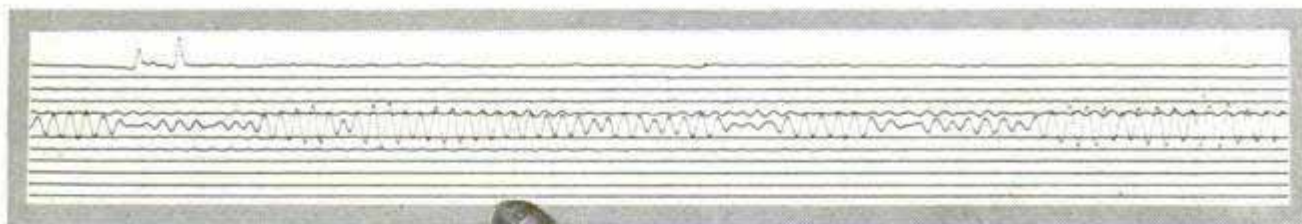
Most people find it hard enough to tie a knot with two hands. So, try to imagine that awed look of amazement when the magician, with a sudden outward flip of his hand, ties a knot in the center of a large silk handkerchief.

This little interlude is quite easy. Hold the handkerchief as shown. A quick forward movement of the hand will bring the end A around so that it can be gripped between the first and second fingers at the point marked B. Holding the end A at the point B, the performer gives the handkerchief a quick outward toss, the knot magically forms in the center, and there you are!

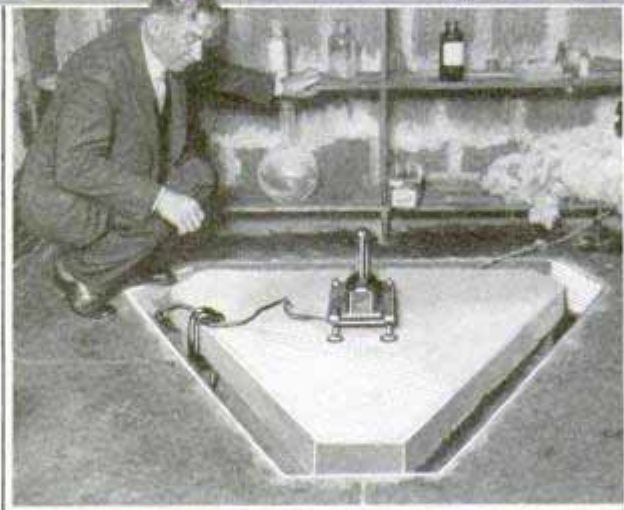
## SLIGHTEST TREMORS OF EARTH SHOWN ON NEW RECORDER

Earth vibrations as slight as one ten-thousandth of an inch are registered on a new recorder which is being tested in a government laboratory, thirty-five feet below the surface of the ground. Records are made photographically, the displace-

airplane or automobile, and some of the first waves will pass a quarter of the way around the world in ten minutes. The new instrument detects earthquake waves which may be flowing from one side of the sphere to the other, and is expected to prove of still further aid in predicting the occurrence of quakes that might be disastrous. Scientists keep track of the



ments or vibrations being shown 1,000 times greater on the record than they are during the actual movements incident to a quake. Study of the tremors with this and other instruments has shown that the shocks travel at tremendous speed, at least four times as fast as the swiftest



Quake Register in Government Laboratory below the Ground, and Sample of the Record It Makes

normal variations in earth movements and are sometimes able to issue warning when unusual tremors are about to take place.

Names and addresses of manufacturers of articles described will be promptly furnished, free, by our Bureau of Information.

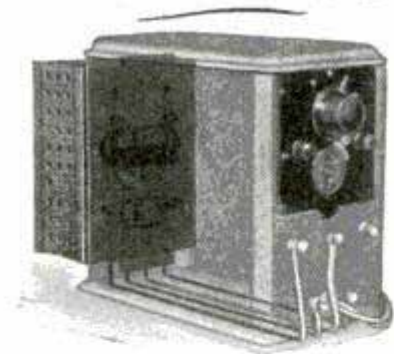
Encl. - W. H. Macy, 4/6.39  
 13.7.1939  
 J. H. ...



### Greater Selectivity for the Old Set

Sets that may have been amply selective a year or so ago now fail to separate the crowded broadcast channels. Selectivity is, of course, a matter of circuit design, the present-day set being selective because it has low-resistance circuits, well-shielded tuning units and the tuning condensers now used have the proper capacity variation. There are several ways of sharpening the tuning of the old set, however, without making any radical changes. A variable high resistance, shunted across the antenna and ground posts, reduces the signal pick-up from powerful locals when the operator is trying to cut through for distant stations. Another method is to make the detector less sensitive, which may be done by substituting a variable grid-leak for the fixed type or by placing a variable high resistance across the grid and grid-return terminals of the detector socket. Shielding will add materially to the efficiency of the old set. This may be done by lining the cabinet with tinfoil, shellacked to the inside for general shielding, and by providing metal partitions between the tuning units.

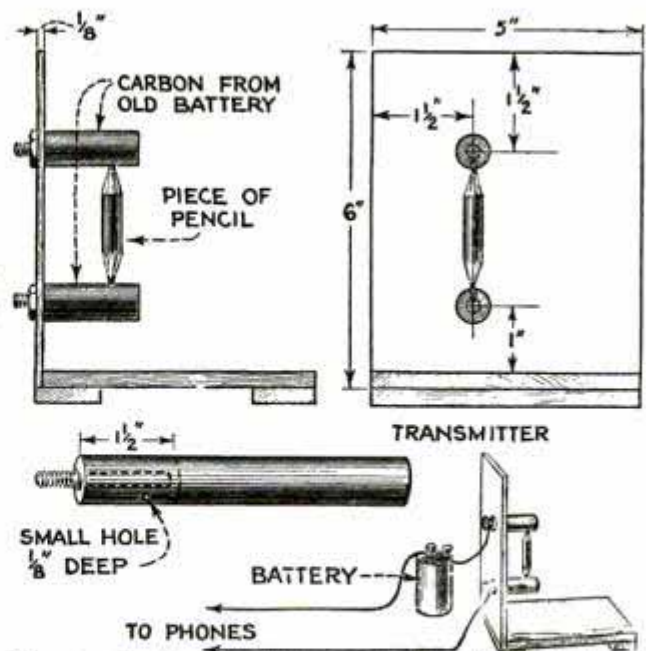
### New Rectifier for A-Eliminator



A new dry-plate rectifier for A-eliminators of the type shown in the illustration has recently appeared on the market. It replaces the dry unit originally supplied with the A-power device and is said to give longer life and quieter operation. Being inclosed in a perforated metal case, it may be fastened to the eliminator in the manner shown. Two connections are all that are necessary to install it.

### An Experimental Microphone

The microphone for the beginner, shown in detail in the illustration, is a homemade device that requires but one dry cell for its operation. When connected to the battery and headphones or a radio amplifier,

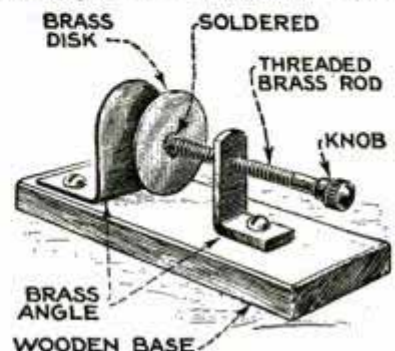


Construction Details of Homemade Experimental Microphone; Below, Completed Unit Showing Connections

it will transmit speech with good audibility. The person speaking should stand about 1 ft. away from the "mike." The construction requires little comment. The pencil, sharpened at both ends, is placed loosely in the holes in the upper and lower carbons so that it will move freely. Do not use too much battery;  $1\frac{1}{2}$  volts is sufficient for good results. The author has found this device very sensitive, and many interesting experiments can be worked out with it. The carbon may be obtained from discarded batteries.—A. C. Alderton, Wanganui, New Zealand.

### Homemade Aerial-Coupling Condenser

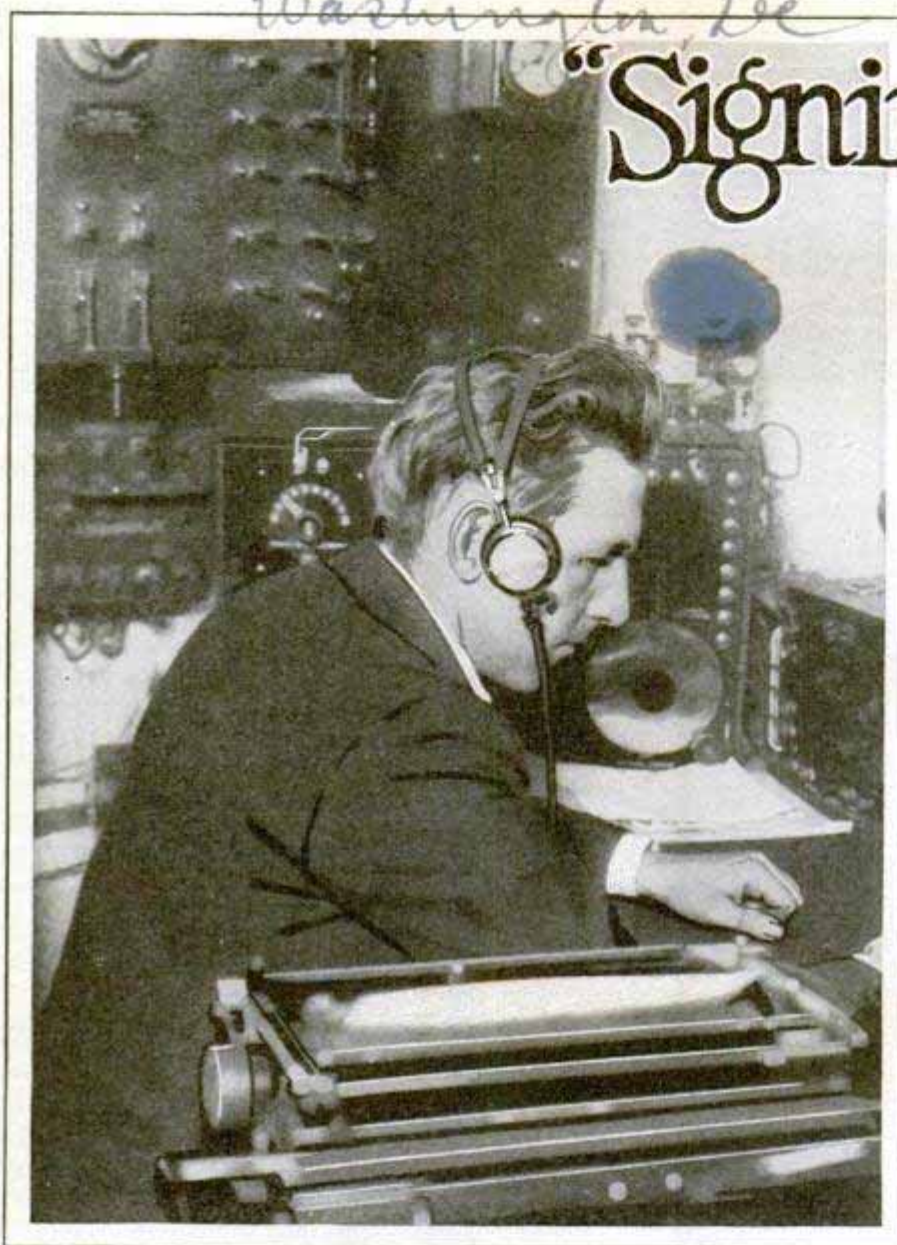
In trying out several short-wave hook-ups, I noticed that the commercial antenna-coupling condensers are not easily adjusted for maximum effect. The sketch shows a simple homemade type that works satisfactorily, as it provides a means of very fine adjustment. The sketch is self-explanatory. Small variable condensers of this type are useful for neutralizing or balancing, and the experimenter will find it convenient to have several on hand.—A. B. Robbins, Muscatine, Ia.



Cordell Electric Supply Co.



1030. Linn. 1122. Allen 11-1-12  
Hasslell, 4301 Rigby Ave  
Washington, D.C.



## "Signing Off"



Arthur Jensen, Radio Operator of the S. S. "American Shipper," Telling the World the "Vestris" Survivors Had Been Rescued

who was lost on the tragic voyage to South America, that the "operator of the 'Vestris' handled his end of the distress traffic in a commendable manner from the time this observer first heard his signals

WHILE science is constantly devising means of securing safety on land and sea and in the air, in the final analysis it remains for mankind to furnish the heroes.

Radio, or wireless, as it was called in the days when the world first thrilled at its efficacy and felt more secure because of its existence, provides a way, but it still takes men to do the deeds.

Michael J. O'Loughlin, the newest name on the permanent roll decorating the fountain of honor in front of the barge-office tower, down at the Battery in New York, received the same kind of commendation that was given comrades in the service who have thought of others before they have thought of themselves.

A federal radio official said of this man,

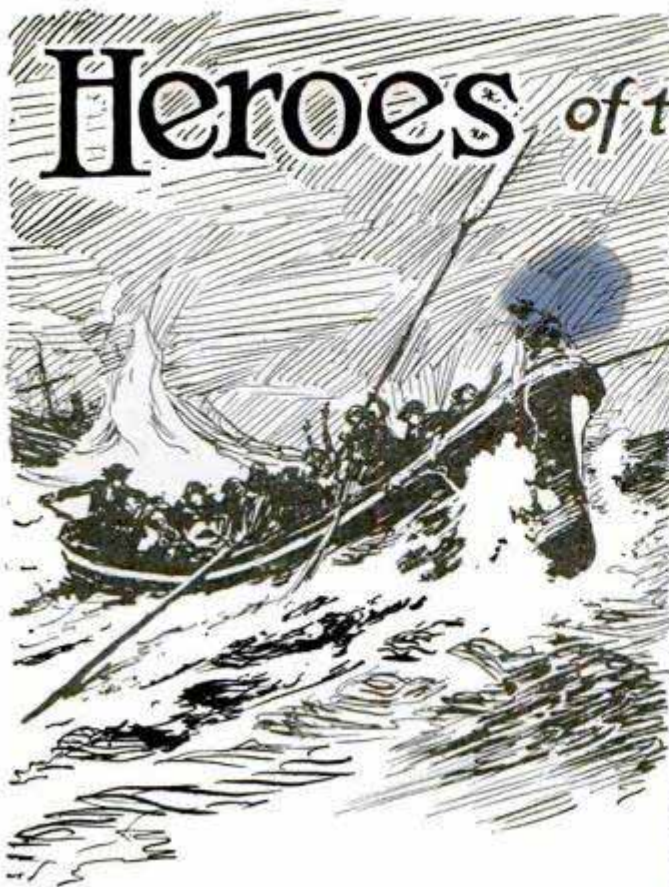
to the last transmission on failing power a few minutes before the last signals on his emergency set were sent, notifying all stations the ship was being abandoned."

There are twenty-three additional stories, each with its own scenery and characters and all with the same plot, which tell of the cruelty of the sea and the self-sacrifice of men whose minds responded so brilliantly in emergency, and whose generosity was so great that their lives were their gifts.

No matter whether the ship foundered on a reef, collided disastrously in fog or was a victim of fire or storm, each of the wireless operators who died at their posts, did the same thing—gave his life for others. Then there are those who have shown forgetfulness of self in relinquish-



# Heroes of the "SOS"



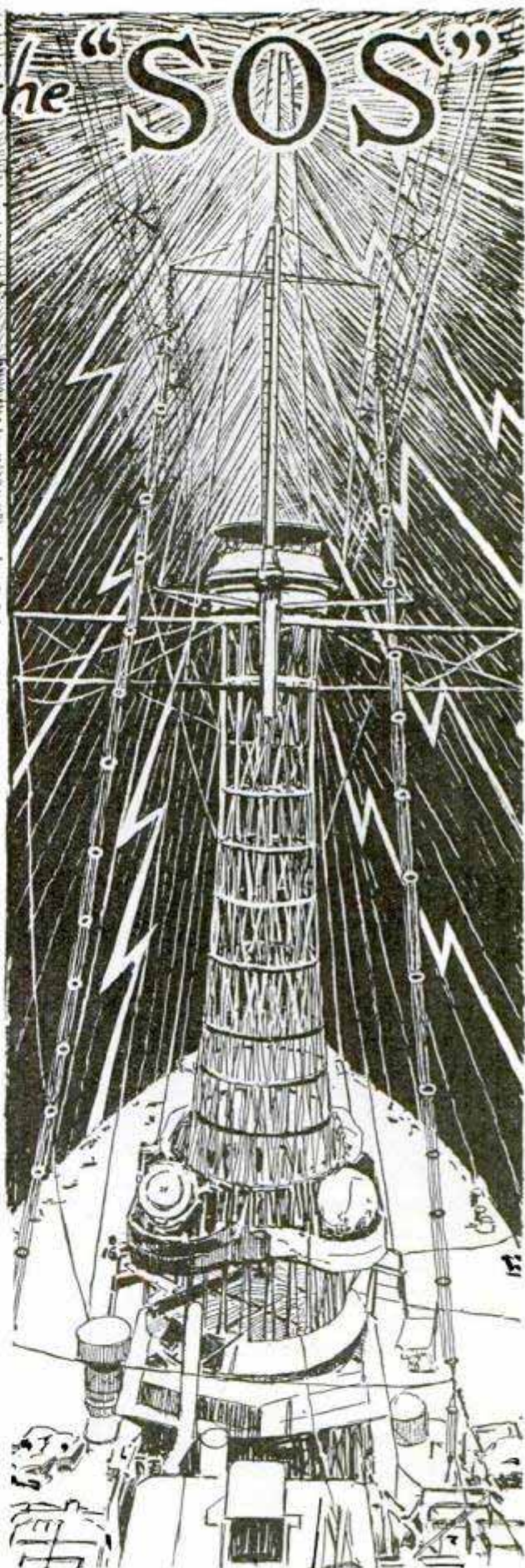
ing places in lifeboats or giving up means of remaining afloat.

One youth rushed from his bed, pajama-clad, and in the three minutes before the ship sank, adjusted the auxiliary wireless set and succeeded in getting a call through. When both dynamo and storage batteries had been submerged by the sea, another operator and his chief succeeded in making the set function temporarily.

After performing fast work with the key, the wireless man of an Atlantic vessel gave up his life belt to a passenger. Out on the Pacific coast, another relinquished his hold on driftwood in order that it might support a woman.

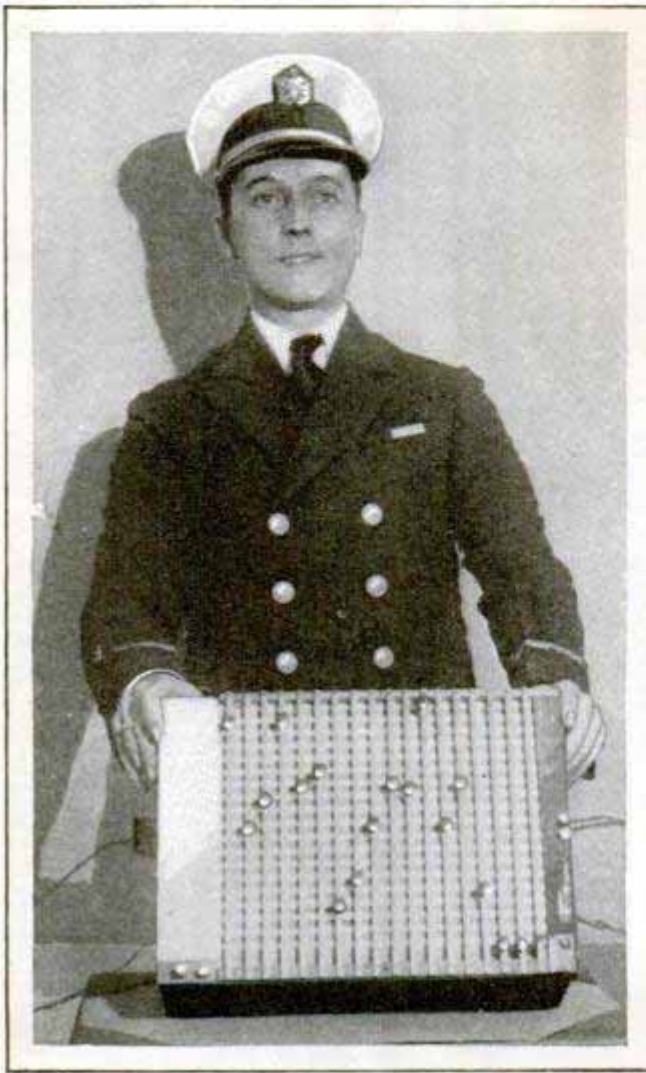
The memorial which bears the stories of sea dramas was dedicated in 1912, after Jack Philips, the wireless operator of the "Titanic," had inspired the world to create a memorial to marine messengers. Under the inscription, "In memory of wireless operators lost at sea at the post of duty," appears first the name of George Eccles.

He was instrumental in saving 200 persons when his ship, the "Ohio," went on an Alaskan reef nearly twenty years ago. In the thirty minutes left to the "Ohio," he raised an Alaskan station which signaled two near-by vessels. In 1910, Stephen Szepanek flashed the call for help



Cage-Type Aerials Swing in Festoons from the Basket Masts of Battleships; This Is a View from the Masthead of the "New Mexico"





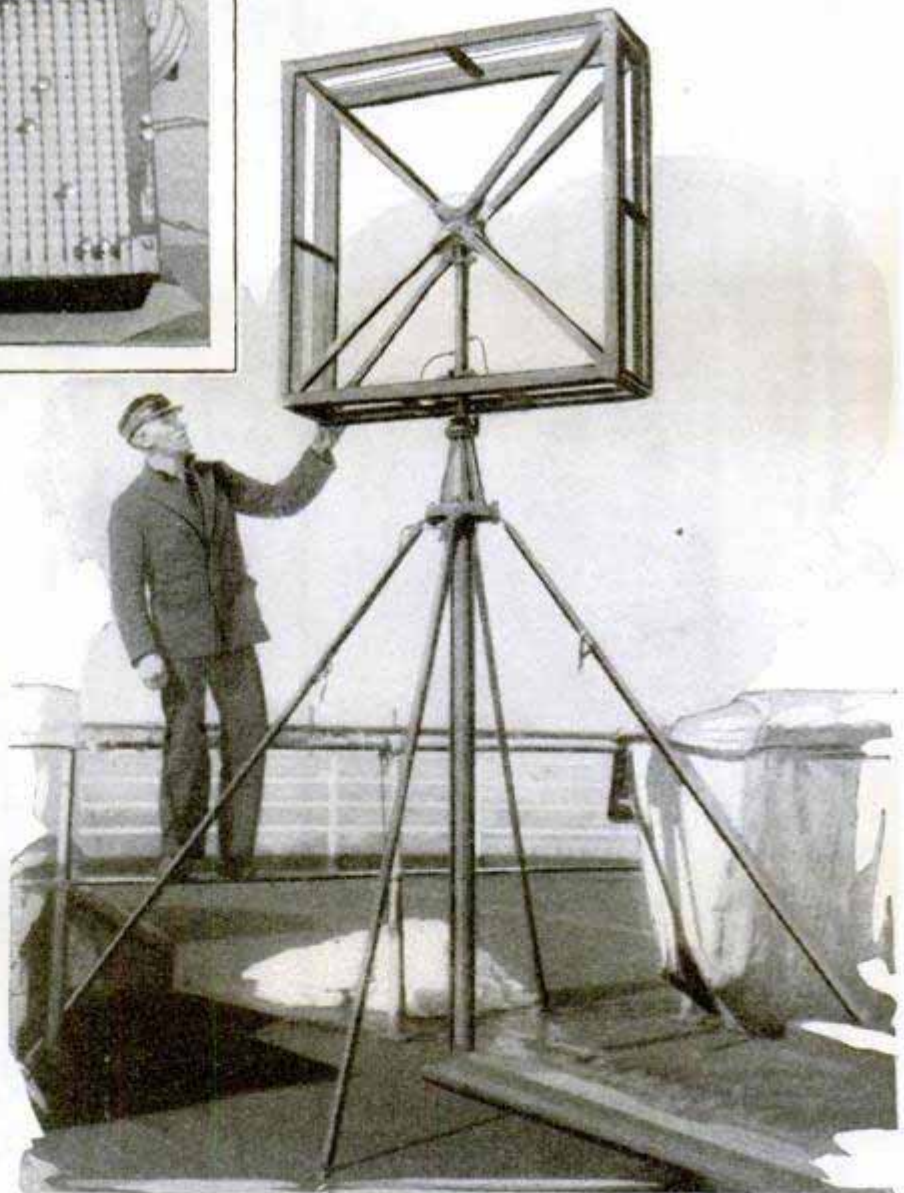
being awakened when the "State of California" struck a reef in Gambier bay, Alaska. As so frequently happens, the dynamos failed and his main wireless set was rendered useless. However, in those three minutes he brought the auxiliary set, which runs on storage batteries, into use and succeeded in getting aid. He was made a prisoner when a lifeboat broke loose and jammed the door of the cabin, and sank with the ship.

When the "Monroe" was in a collision off the coast of Virginia, in January of 1914, Ferdinand J. Kuehn stayed in the wireless room flashing out calls for help until he was sure that assistance was coming. As he went on deck to assist in loading the small boats, he met a woman crying for help. Since she had no life pre-

when the railroad-car ferry which plied the Great Lakes sank as it approached Milwaukee. Whether a submerged rock or shifting loaded cars caused the plunge of the ferryboat is not certain. When help arrived, there was no trace of the vessel.

On the Pacific ocean, in 1913, young Lawrence A. Prudhunt refused a place in the lifeboats to stay at his task of summoning aid to the "Rosecrans." Due to his efforts, three men were saved of the crew of thirty-six. There were no passengers on board.

It was Donald Campbell Perkins who worked so desperately fast after



Lieut. Pedro C. Andres, of the Cuban Navy, with an Automatic SOS Sender of His Own Invention, Top, and the Directional Loop of the "Leviathan"





A Lone Sentinel Standing Guard over the "Celtic," After the Big Liner Ran Aground on the Rocks, While Entering Queenstown Harbor, Ireland, without a Pilot in a Dense Fog

server, he gave her his own and helped her into a lifeboat. There, by the davits, his foot slipped and he fell into the water, never to be seen again.

In April of that year, Walter E. Reker displayed his resourcefulness and bravery in a collision when the "Admiral Sampson" and the "Princess Victoria" crashed in Puget Sound. The "Princess Victoria" stood by so close to the sinking vessel that passengers could climb from one to the other until damaged oil tanks caused the "Admiral Sampson" to catch fire. Although the operator of the slightly injured vessel wirelessly that he would send for help, Chief Operator Reker stayed at his post until his calls were through. Afterward he assisted passengers to the lifeboats. When the last load had left, he reported to the captain on the bridge and went down with the ship.

A man of only seventeen years offered his life for others and gave it for one woman when the "Francis H. Leggett" foundered on the Duxberry reef off the west coast, in September, 1914. Clifton J. Fleming went down with the ship after staying at his post. Coming up in the pounding sea, he grasped a piece of wreck-

age for support. When he discovered a woman struggling in the water, he assisted her to the drifting wood and relinquished his hold upon it, since it would not support both. His assistant, Harry Fred Otto, had stayed with him in the wireless cabin sending out calls, until the Pacific closed over the little room. He was not seen again.

It was Adolph J. Svenson who, with his chief Loren A. Lovejoy, rigged up an auxiliary set as soon as the water ran off the storage batteries at another lurch of the sinking "Hanalei." When the wireless cabin was swept overboard, he assisted the chief in sending signals to the nearby Pacific shore with a flashlight. In spite of the fact that men on land could see the signals, it was almost impossible, due to the storm and terrain, for them to effect a rescue. When only wreckage remained of the "Hanalei," Loren Lovejoy was picked up from the piece of driftwood to which he was clinging by a passing ship. Adolph Svenson was added to that band who died on duty.

There follows a period of years when war added hazards to the seas. Mines, submarines and the danger of collision





Navy Radio Operator Broadcasting Weather Maps to Ships at Sea; This System Is One of the Most Important Advances in Navigation

© U. & U.

from running with few lights were new perils to augment wind, fog, fire and uncharted reef.

George Arundel Gear gave his life during those troublesome days. His ship was the "Manga Reva." His message, "Come as quickly as possible; am drifting before the wind with no boats," was sent off the coast of France. Neither he nor his captain had the comfort of knowing that other ships were racing to the rescue, for his last call reported, "No responses to calls for assistance. Going fast."

During the war, when armed naval guards were aboard merchant steamers, the tanker "Motano" was torpedoed by a submarine. Sinking within a minute's time, Russell A. Williams, the wireless operator, was among those to lose their lives.

Another disaster in which the ship sank so rapidly that very little rescue work could be done, was that off the Atlantic coast, on May 1, 1918, when, during a dense fog, a French warship rammed the

"City of Athens," a steamer in the coastwise trade. Francis Joseph Doherty, the wireless operator, went down with the ship.

Emile H. Hulsemann's last message was heard on Feb. 29, 1920. It is believed that the wireless of the "Cubadist" was torn away in the gales that characterized that season off Cape Hatteras and which took toll of this ship among the coastal traffic.

When the "Macona" struck a rock off the Nidigen light on the Swedish coast, Lawrence B. Robinson, wireless operator, lost his life. Only one of the crew of fifty was saved.

Evidences of fire on the drifting wreckage, marked with the name of another ship to join the mysteriously sunk, the "Swiftstar," gave evi-

dence that Ernest E. Dorsey was given no second to flash SOS. Mariners believe that this tanker was struck by lightning.

Two days after Christmas, 1923, within an hour after he had signaled that the number-one hold of the "Conejos" was filling with water, Fred Salim sent a last SOS reporting that the ship was sinking fast and giving its position in the Black Sea. Although its sister ship, the "Clontarf," and other vessels rushed to the aid of the distressed boat, no traces of it were found.

When the "Haleakala" was twenty-five days overdue, it was decided that it had been lost in the hurricanes which were sweeping the Atlantic coast. Peter L. Bacuinka was the radio officer who went down with this ship. About 200 miles west of the Philippines the freighter "Elkton" went down after the wireless operator, Charles F. Ruble, had flashed that it was disabled.

A smear of oil spreading for five miles was the only trace found of the "David



C. Reid" when rescue ships arrived. They had plowed through a storm area off the Azores after they received messages calling for help in October of last year. Maurice Black first radioed, "We are in a bad way. Come over." "We are going fast," was the cry seven minutes later.

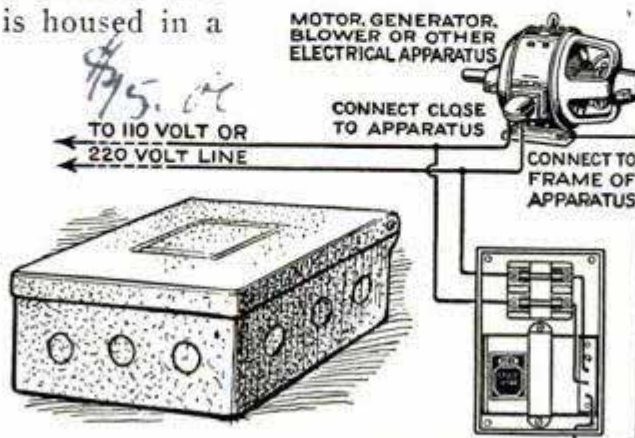
There are three other men who were licensed to handle ships' wireless and who were lost at sea at their post of duty. Boris Michael Dutko was on the "Brindilla," which was lost in December of 1919. James J. Curran's ship, the "Moreno," went down in June, 1917, off the Azores. Lawrence M. Waring, Jr., lost his life on the "Cotopaxi," which foundered off the Florida coast in December, 1926.

At the dedication of the memorial, Commissioner H. Cabot Ward linked science and men and deeds in saying: "It is a wonderful quality of the human soul that new conditions always bring new manifestations of heroism."

### Device Stops Man-Made Static

The filter shown in the sketch is a new development in the radio field along the line of devices designed to eliminate man-made static at the source. The manufacturer maintains a special service to help those who are confronted with such interference, which is a real problem for radio listeners. It is claimed to take out static caused by motors, blowers, fans, sign flashers, ice machines or any electrical device using 110 or 220 volts regardless of horsepower. The connections are simple, and the unit is housed in a metal container with holes for easier installation.

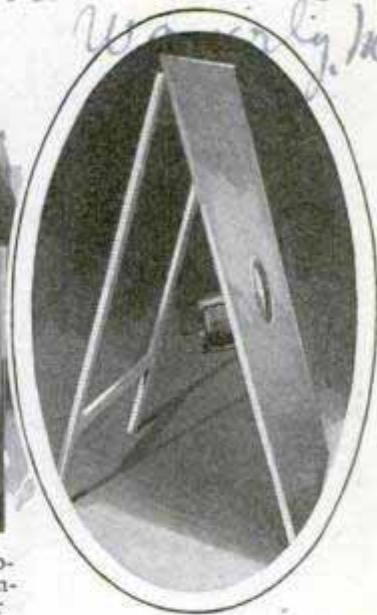
Popular Mechanics radio department offers its services free to all readers. We will be glad to help you with your problems and will promptly answer all inquiries.



Left, Filter Device Inclosed in Metal Container; Right, Diagram of Connections



Left, Combination Radio and Phonograph Unit, with Three Turntables; Right, Dynamic Speaker



### Radio and Phonograph Amplifier

A simplified arrangement of phonograph pick-up unit and power amplifier combined with a radio set is illustrated herewith. This device is now available for small motion-picture theaters or other public places where loud volume and continuous programs are required. Three phonograph turntables are arranged to permit interchange of records without interruption. The dynamic speaker supplied with the combination unit is mounted on a large baffleboard which is supported in easel fashion.

### A. C. Tube-Operating Hint

A.c. tubes, such as the CX-326 and C-327, and particularly the latter, operate at comparatively low voltages and high current; the CX-326 at 1.5 volts and 1.05 amp., and the C-327 at 2.5 volts and 1.75 amp.

Unless a socket whose spring terminals make very good contact with the tube prongs is used, the contact resistance between the tube prong and the socket terminal may be sufficient to reduce current supply to the C-327 to a value that is too low for satisfactory operation.



# Bench for Spanish Radio Cabinet



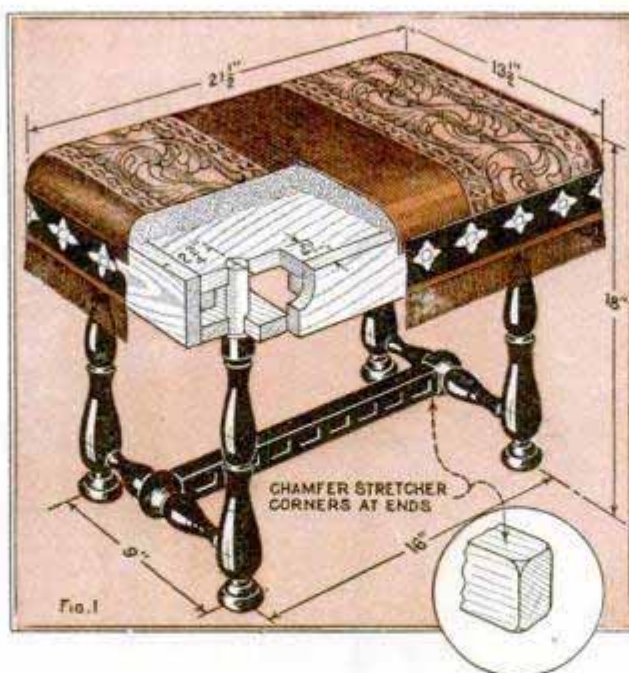
THE BENCH described here is designed to harmonize with the Spanish radio cabinet illustrated in the October and November, 1928, issues of Popular Mechanics, but it is a handsome piece of furniture, and well worth building for its own sake. The construction is simple and the upholstering is easily done.

Either hard or soft wood may be used for the frame of the seat, and the construction is so well shown in the illustrations that no details are necessary. The four legs are turned from 2 by 2-in. rough walnut, which, if accurately centered on the lathe, will easily give the largest required diameter of  $1\frac{3}{4}$  in. See Fig. 4. A little time in turning is saved if two legs are turned from the same stick. Use rough walnut stock, 1 by 2-in., for the stretcher, which is detailed in Fig. 6. If the legs of the radio cabinet were made of flat stock,

the legs of the bench should be made to correspond, and Fig. 8 details this construction. Cut four pieces of 1 by 6-in. rough walnut for the legs, smoothing two sides of each. Blanks for the two rails are made from stock 3 in. wide by 10 in. long.

Glue the rounds to the stretcher, then add the legs and slip the seat on. Reinforce the upper ends of the legs by nailing through the seat. If the work has been well done, the assembly should be square, and the stool should stand with very little tendency to rock. Before adding the upholstery, fill the stretcher and legs, then varnish or wax the walnut to correspond to the finish given the radio cabinet.

Unroll cotton batting on the seat, lapping it back and forth until the pile, when compressed, is  $1\frac{1}{4}$  in. thick, stepping back the ends of the upper plies to give the curve to the edges. Allow the cotton to project a little beyond the sides and ends, so that the rail edges will not





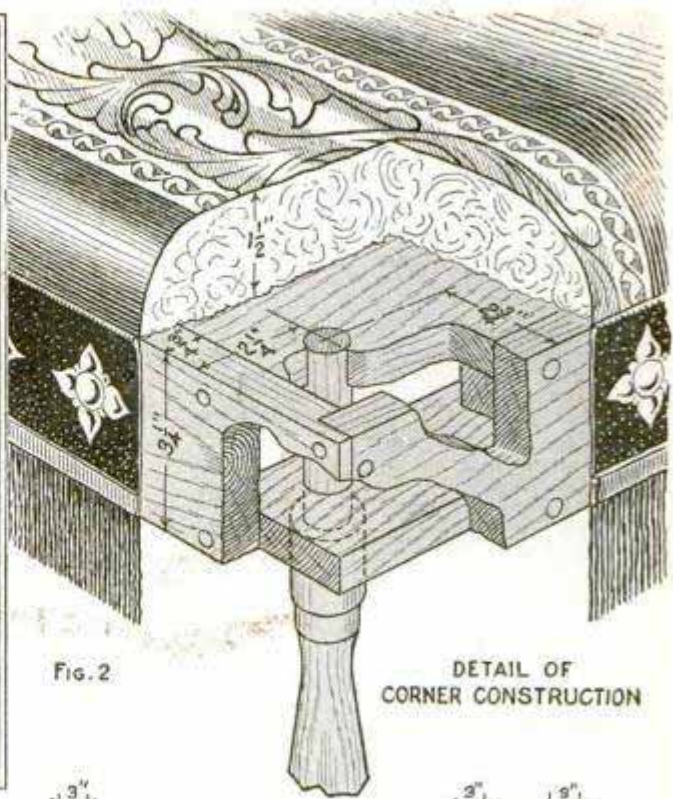
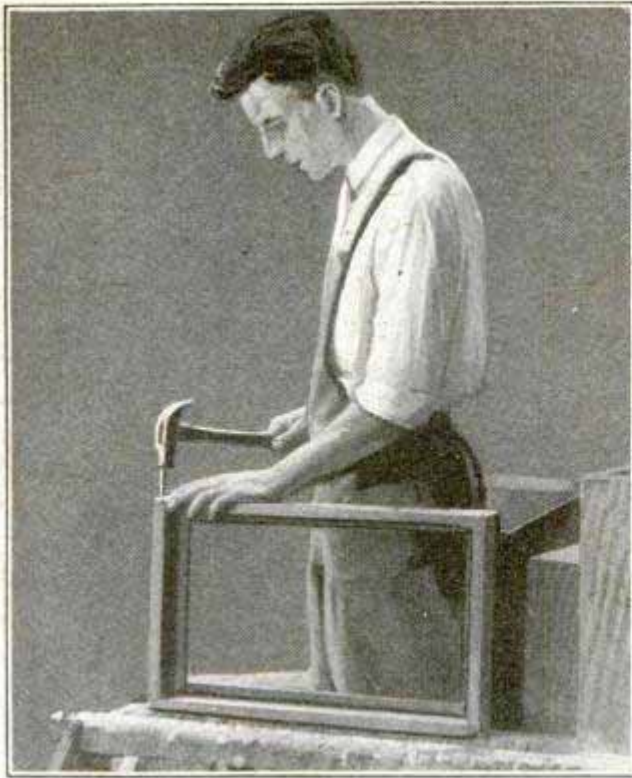
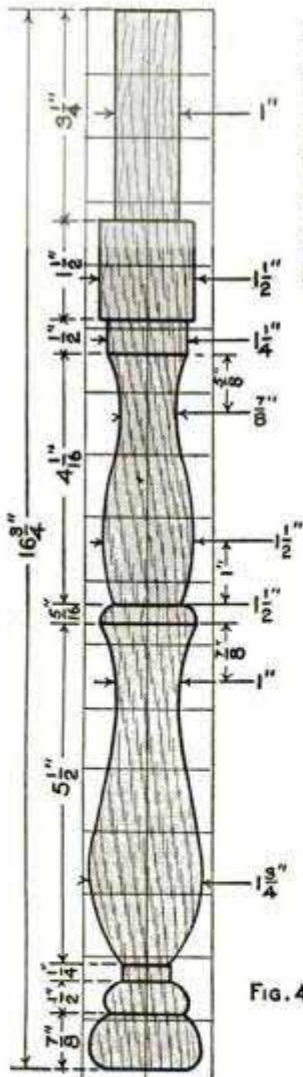
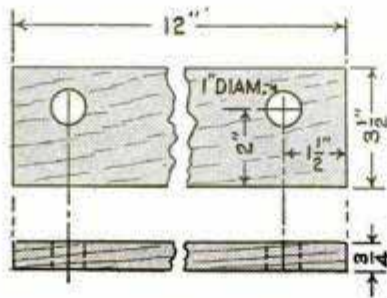


FIG. 2

DETAIL OF  
CORNER CONSTRUCTION

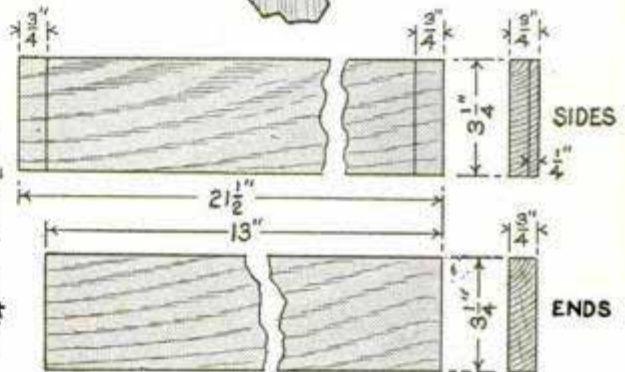


LEG DETAIL  
4 REQUIRED

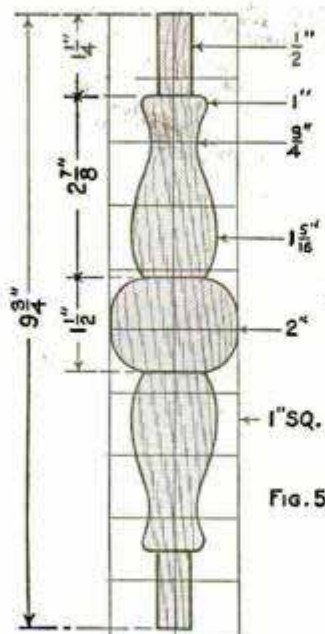


CLEAT, 2 REQUIRED

FIG. 3

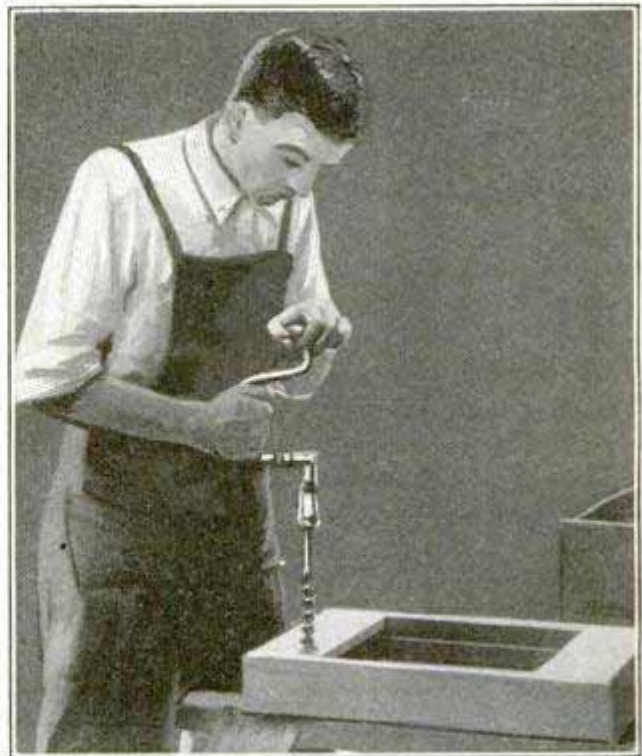


RAIL DETAILS

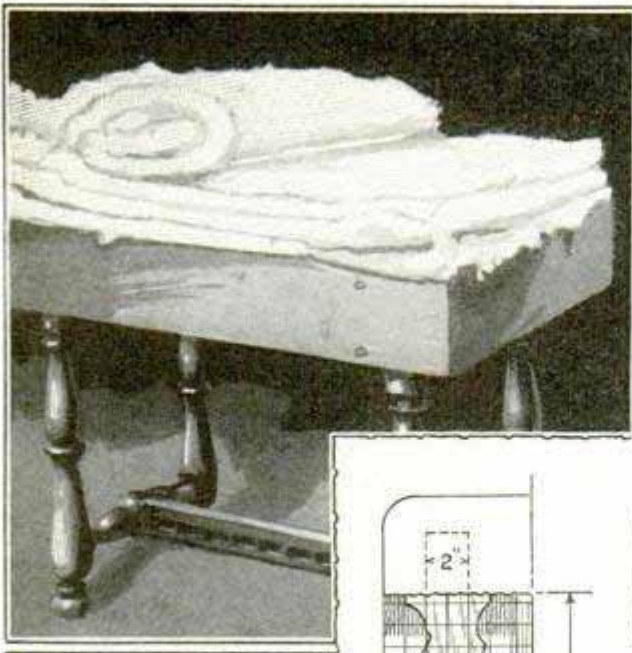


ROUND DETAIL  
2 REQUIRED

FIG. 5







jut out when the covering is drawn tight. Cover the stuffing with a piece of stout cloth, tacked in the centers of the sides and ends. Finish tacking by working toward the corners, and apply the tapestry.

Cut a strip of plush, 4 in. wide and 6 ft. long, for a band. Prepare a strip of narrow strap iron by punching holes every inch. Nail this around the top edge of the seat frame to hold the upper edge of the plush, pile inward. Sew the corner of the band and pull the plush down over the iron until it is tight. Tack the lower edge under the rails. Sew the metal fringe to the band.

The seat illustrated was covered with brown brocade having gilt flower designs and stripes in light blue and old rose edged with black and yellow. This same material was also used for the radio grill. For the band, a dark vermilion bordering on maroon was chosen, and this was used as backing for the radio-cabinet plaques.

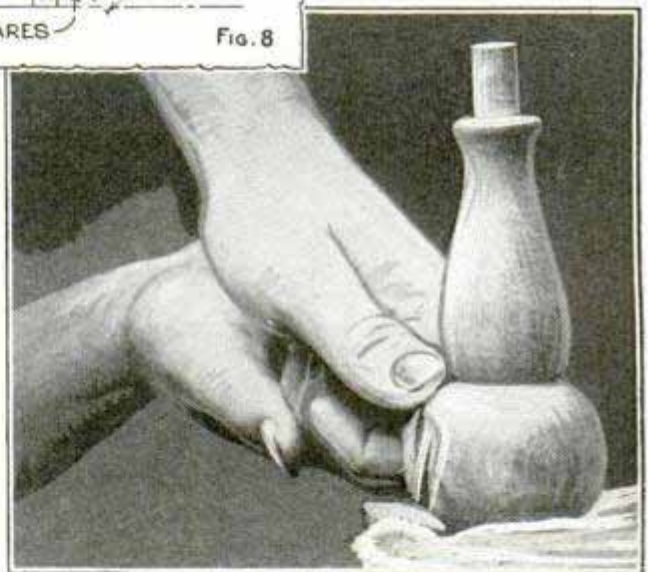
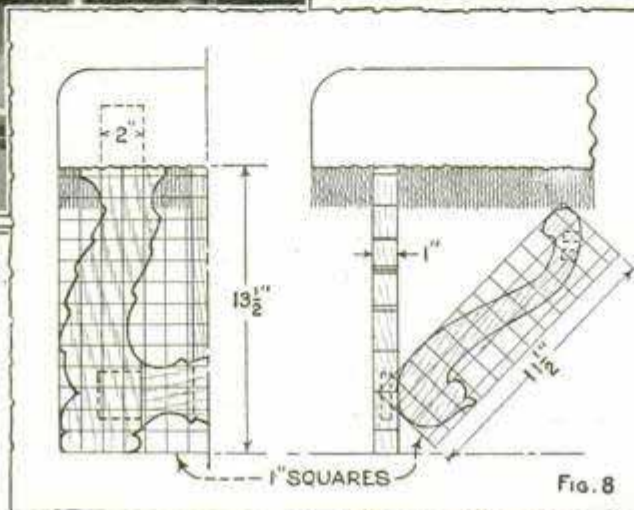
The ornamental nail heads, shown in Fig. 7, are laid out on  $1\frac{3}{4}$ -in. circles. Make a full-sized tracing with which to transfer the design to 21-gauge sheet brass. With tin snips cut the designs into individual squares, and cut the outlines with a jewelers' saw. Prick-punch the centers, scribe the center circles, and outline them

with a narrow chisel made by hammering and filing a round-nosed flat point on a spike. Use a hardwood block when outlining. Then lay the ornaments, upside down, on a soft-wood block and hammer up the centers and petals, using the round end of a glass-cutter handle, the ball of a hinge pin or any other available tool. "Antique" by heating in a flame, punch the centers for round-head brass escutcheon nails, and nail them to the stool rails,

as indicated, spacing them evenly with dividers.

The corner clasps are four in number, being designed as an overlapping pair of nail heads.

The photos accompanying the drawings show the following opera-



tions: page 655, nailing the seat frame together and boring the holes in the cleats for the ends of the legs; page 656, the laying of the batting for the seat covering, and the paring off of a round to take the shoulder of the stretcher; page 657, boring a leg for a round, marking for the stretcher flat on a round, hammering out a nail head and two of the finished heads.

If you cannot get good walnut to make this stool, write to the Radio department, and we will tell you where to obtain it. Do not "spoil the ship for a ha'p'orth o' tar" by using soft wood.



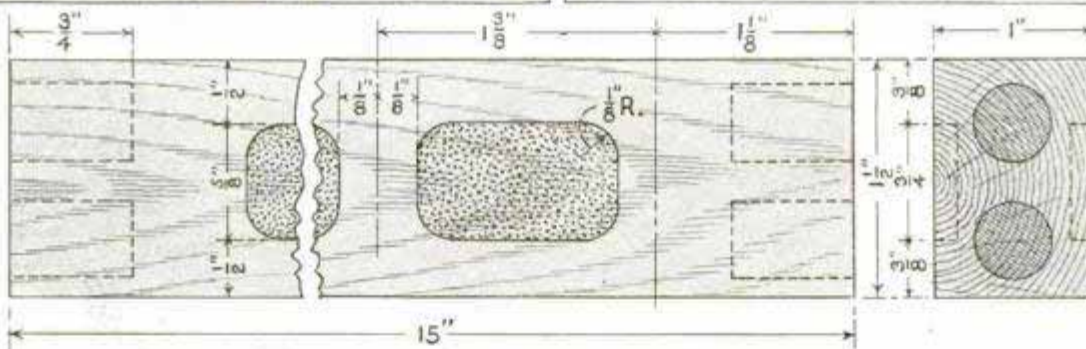
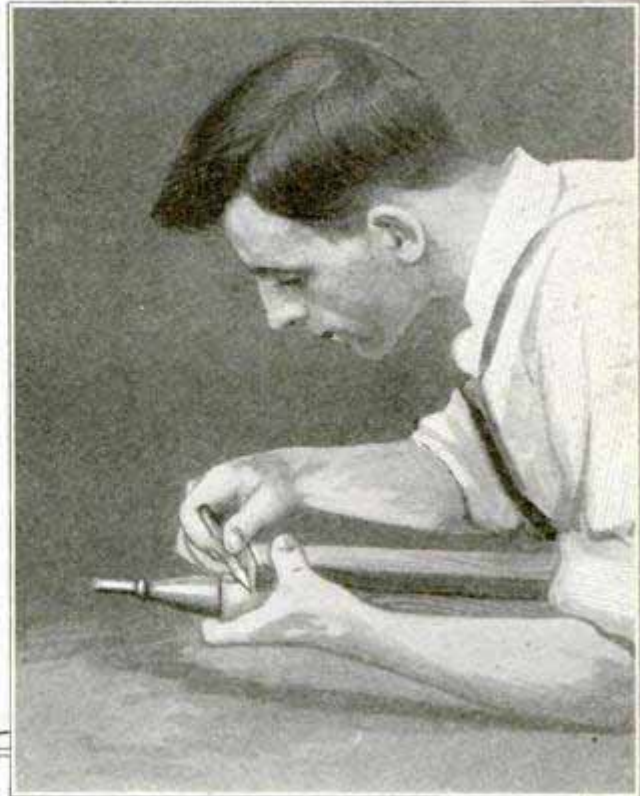
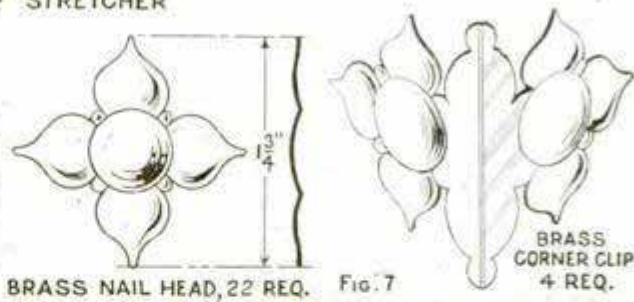


FIG. 6

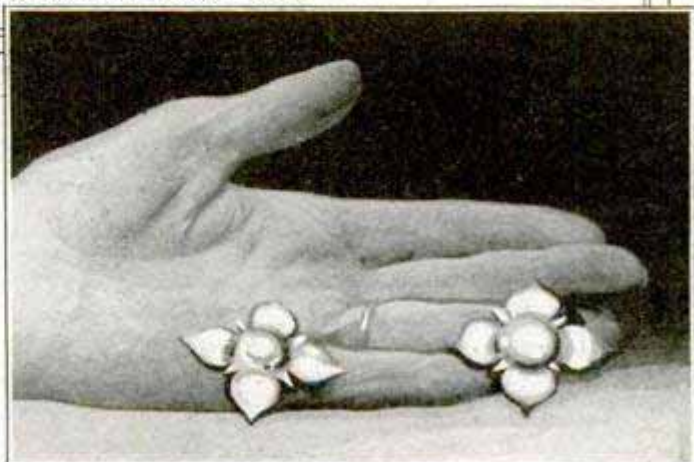
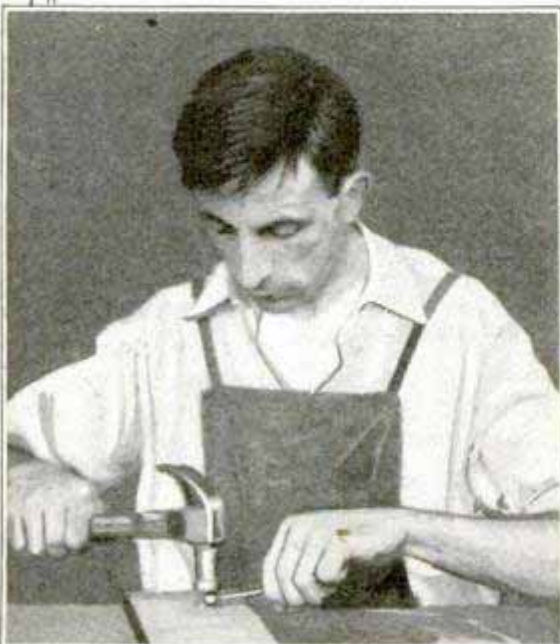
DETAIL OF STRETCHER



BRASS NAIL HEAD, 22 REQ.

FIG. 7

BRASS  
CORNER CLIP  
4 REQ.

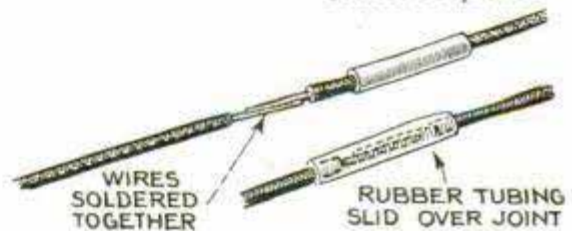
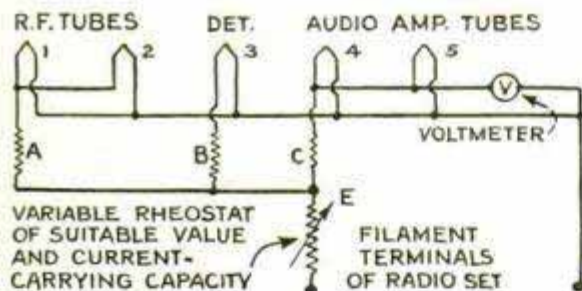




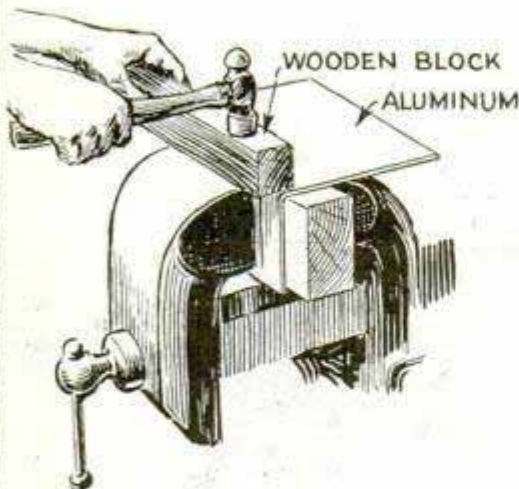
# Helpful Radio



To Prolong Their Life, Connect Tubes of Like Characteristics in Groups on Variable Strip-Type Resistors, as Shown Below (Left) at A, B and C; Adjustment for Decreasing Voltage Is Then Made with Master Rheostat E; with Most of Resistance of E in Circuit, Vary A, B and C Until Voltmeter Placed across Filaments Shows Correct Voltage. Then Solder Clips in Position; Permanently Connect Voltmeter; E Now Varies Voltage Applied to All Tubes in Correct Proportion



Above, a Short Piece of Rubber Tubing Insulates Soldered Joint; the Wire Should Be Twisted to Insure a Good Mechanical Connection

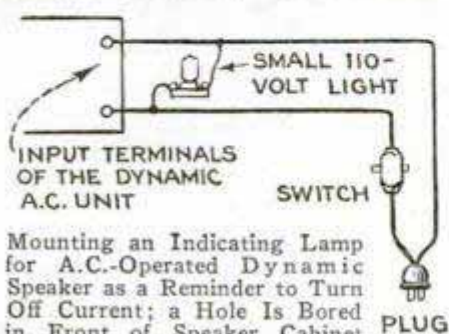


Bending Aluminum Sheet for Homemade Shield Boxes Is Not Difficult, if Done as Shown Above; Right, Lead-In and Power Supply from Double-Outlet Wall Plate; Antenna and Ground Connections Are Made to One Plug and the 110-Volt Supply Connection to Another





# Hints from Experts



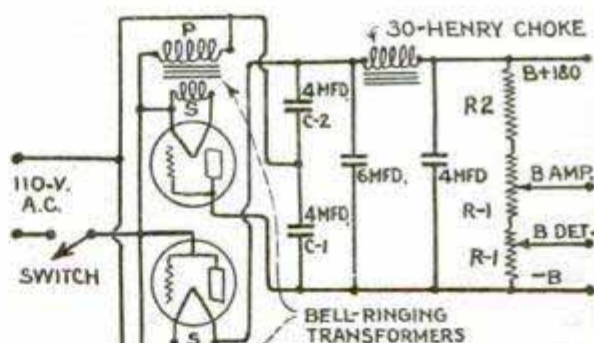
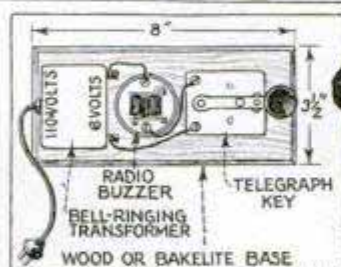
Mounting an Indicating Lamp for A.C.-Operated Dynamic Speaker as a Reminder to Turn Off Current; a Hole Is Bored in Front of Speaker Cabinet and Light Mounted behind a Jeweled Port and Connected in Supply Line as Shown



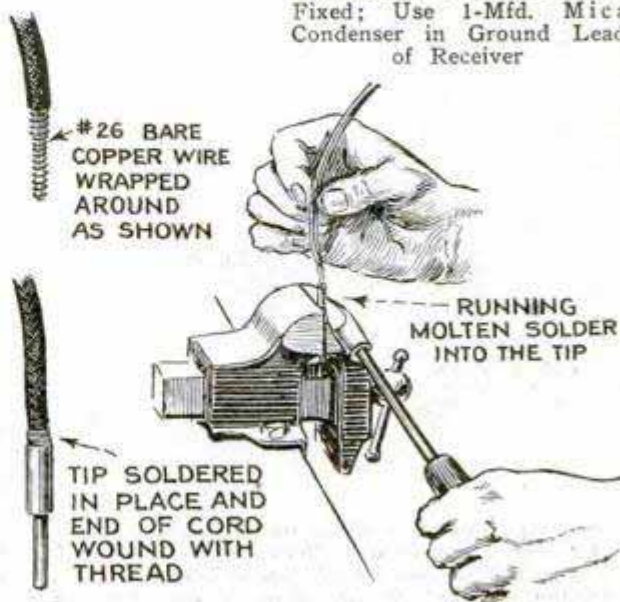
ABOUT 6 FT. LONG

OLD BRASS WELL POINT

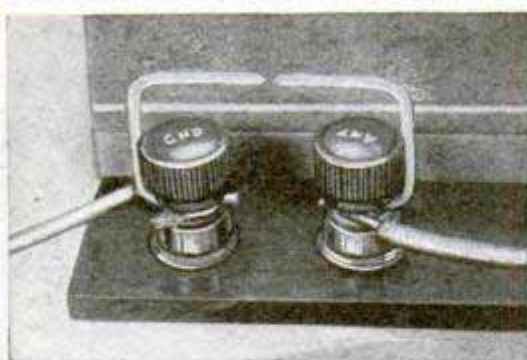
An Excellent Ground Connection Made from 5 Ft. of Brass Pipe, Threaded for an Old Brass Well Point and Ground-Wire Connection; When Ground Wire Is Connected Cover Top Connection with Waterproof Paint; Below, Code-Practice Set Operated from 110-Volt House-Lighting Supply Gives a Steady Signal Which Does Not Change Pitch; Lower Right, Soldering Tip on Broken Tinsel Phone Cord Is Not Difficult, if the End of the Lead to Be Soldered Is First Wound with Bare Wire



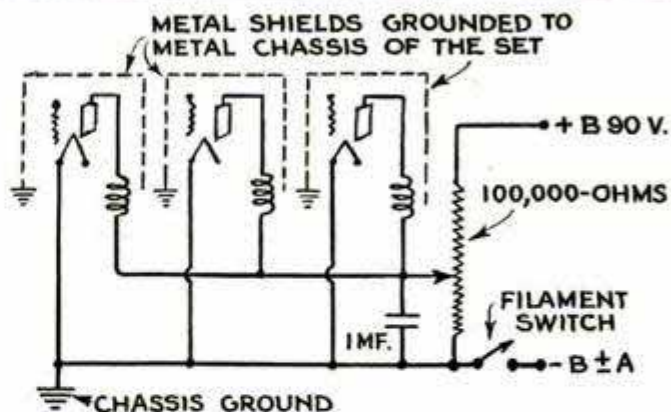
Experimental B-Eliminator Employing 112-Type Tubes as Rectifier; R-1, 5,000-Ohm Variables; R-2, 2,000-Ohm Fixed; Use 1-Mfd. Mica Condenser in Ground Lead of Receiver



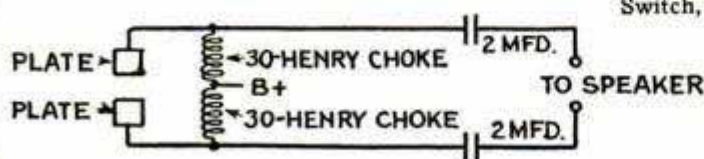




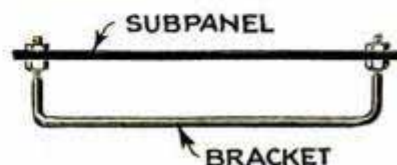
Small Gap. Arranged between Antenna and Ground Posts with Pointed Wires as Shown, Protects Set during Electrical Storms



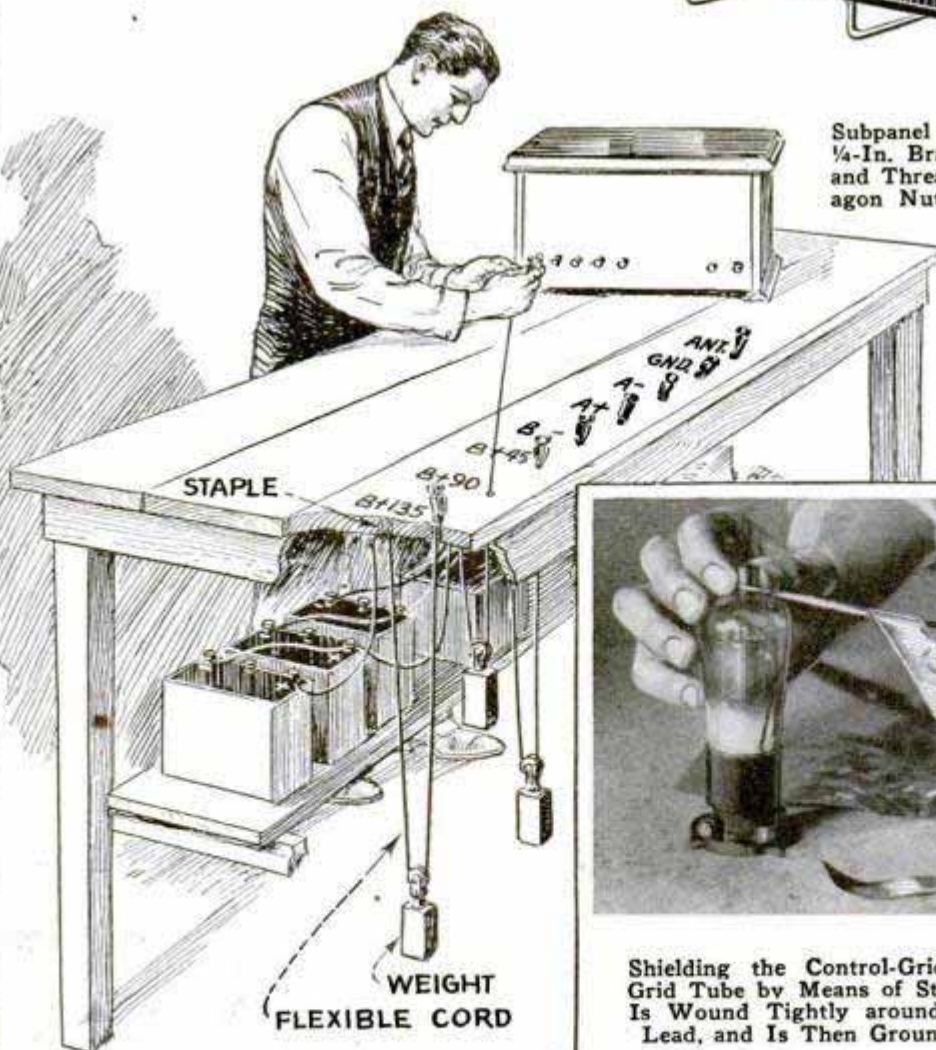
Oscillation Control for Tuned R.F. Sets, Obtained with 3-Tap Variable Resistor; Note Filament Switch, When Turned Off, Cuts Resistance Out of B-Circuit



Double Filter Arrangement, Used in Push-Pull between Power Tubes and Speaker, Claimed to Give Good Response at All Frequencies Instead of Cutting Off at Certain Frequencies as in the Case of Many Output Transformers



Subpanel Brackets Made from 1/4-In. Brass Rod, Bent to Shape and Threaded at the Ends; Hexagon Nuts Hold Panel in Place



Left, Handy Battery-Cord Arrangement for Test Table Makes Quick Connections Easy; the Counterweights Keep the Leads Out of the Way When Not Required



Shielding the Control-Grid Lead of the Screen-Grid Tube by Means of Strips of Tinfoil; the Foil Is Wound Tightly around the Insulation on the Lead, and Is Then Grounded to the Stage Shield



### Curing Noise in Set

The writer has a set that has been performing satisfactorily until recently, when, if anyone walked across the floor, heavy static noises issued from the speaker. Supposing it to be a loose connection, I cleaned the battery terminals, examined the tube and socket connections and renewed the speaker cord, but without improvement. I put in new tubes and batteries; still no improvement. After several weeks of this interference, I found the ground clamp on the water pipe in the basement badly corroded and very loose. This pipe being directly beneath the floor of the room in which the set was located was jarred by anyone walking above. A new ground clamp remedied the trouble. The moral is: When things go wrong with the set, start hunting for trouble at the largest connections, for without good aerial and ground contacts, it is useless to tinker with the set.

—Ralph LeCompte, Herbertsville, N. J.

### Grounding of Transformer Cases Eliminates Hum

One of the most troublesome sources of hum is that due to external fields around the power transformers used in the power pack. This trouble may be eliminated by connecting the metal cases or cores of the transformers to either the ground lead or the B-negative lead of the receiver or power pack, so as to bring the cases and cores of all transformers to the low-potential side of the circuit. This also applies to the a.f. transformers, if they are not already grounded to a metal subpanel.



Left, New Tube Checker Showing Plug for A.C. Line; Right, Checker in Operation with Tube Inserted

### Tube Checker Operates from A.C. Line

The new tube checker shown in the illustration operates directly from the regular a.c. 60-cycle lighting circuit and is so designed that the circuit may have any voltage from 90 to 130 volts. It will check all tubes, a.c. or d.c., using filament current of 1.5, 2.5, 3.3, 5 or 7.5 volts, including rectifier tubes. The checker is equipped with sockets for UX, UY and

UV-tubes; a line-voltage adjusting dial; a five-point filament-voltage dial, push buttons and suitable meters. An instruction card is supplied.

ⓘ Dry cells may be tested with an ammeter having a scale of 25 or 30 amp.; the instrument should be held on the cell just long enough to get a reading, and cells showing less than 10 amp. should be discarded. A voltmeter may also be used; a good dry cell should register 1.4 volts and should be discarded when the reading falls to 1.1 volts.

### FOR THE RADIO BUILDER

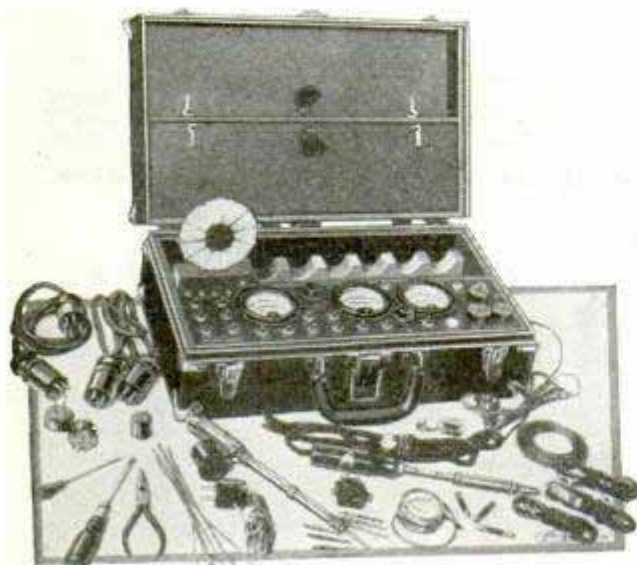
The simplified blueprints listed below include the best of Popular Mechanics tested circuits. When ordering, simply quote the numbers of the blueprints desired and inclose the proper amount in an envelope addressed to Popular Mechanics Magazine, Radio Dept., 200 E. Ontario St., Chicago, Ill. Back magazines containing full descriptions of the circuits can also be obtained. Inclose an additional 25 cents for each magazine desired, giving date of publication.

No. 111, Homemade Tube Tester	July 1926	25c
No. 115, 15 to 550-Meter Three-Tube Receiver	Nov. 1926	25c
No. 116, Three-Tube Loop Set	Dec. 1926	25c
No. 117, Simple Electrolytic B-Eliminator	Feb. 1927	25c
No. 123, Economy-Nine Superheterodyne	Nov. 1927	50c
No. 126, Homemade B-Battery and Charger	Jan. 1928	25c
No. 130, One-Tube Short-Wave Adapter	Mar. 1928	25c
No. 131, Five-Tube All-Electric Receiver	Apr. 1928	25c
No. 134, Edison Type B-Battery	July 1928	25c
No. 135, Screen-Grid Browning-Drake Receiver	Sept. 1928	25c
No. 138, Screen-Grid Perfect-Tone Six Receiver	Nov. 1928	25c
No. 139, Simple Television Receiver	Dec. 1928	25c
No. 140, Power Amplifier and B-Supply for Television	Jan. 1929	25c
No. 141, Hammarlund-Roberts Hi-Q 29 Junior A.C. Receiver	Feb. 1929	25c
No. 142, Two-Tube Screen-Grid Short-Wave Adapter	Mar. 1929	25c



### Complete Kit for Service Men

A complete testing and repair kit for the busy radio-service man is shown in



New Radio Kit Showing the Complete Equipment Required for Testing and Service

the illustration, nothing having been overlooked that is necessary to meet any emergency. Safety devices protect all meters and circuits so that an error in testing will not damage the instrument or the set itself. It can be lifted out of the carrying case for store or laboratory use. Various fixed condensers, from .001 to 2 mfd., a 30-ohm rheostat, a 500,000-ohm variable resistance, and an audio transformer are available for instant use and in various combinations. The kit is equipped with standard meters and makes accurate tests of voltage and current of all radio receivers, including those using the newest tubes.

### Removing Hum from Dynamic Speakers

First determine whether or not the hum is caused by the dynamic speaker, as it may be in the set instead. When located in the speaker, there are several simple methods of reducing and often eliminating the hum. One simple method of testing the speaker for hum is to remove the output tube of the set, when, if the hum continues, it is evidently in the speaker. Dynamic speakers are of three varieties, one in which the field is energized by direct current from a storage battery; another in which the field is energized by means of rectified 110-volt current, or 110-

volt direct current, and a third in which the field is energized by means of current from the B-eliminator. The battery-operated type cannot cause a hum. The second type is the one in widest use and most likely to cause the trouble. The third type seldom gives trouble and when it does, the remedy is usually beyond the average set owner. As regards the second type, simply shunting high-capacity condensers across the field coils will frequently eliminate the hum. These condensers should be of the heavy-duty type from 4 to 8 mfd., the capacity varying with the type of speaker used. In some cases, A-type condensers of large capacity are required across both field coils. In extreme cases, a high current-carrying choke of the type used in A-eliminators, placed in series with the rectifier and field coils in addition to the A-type condensers, will be required.

### World Time for DX-Radio

The radio clock shown in the illustration is now available for DX-listeners who wish to follow the programs not only from their local stations, but of all the stations their receiving set will reach. As seen from the illustration, there is a secondary dial listing the principal time-zone localities, namely, Eastern, Central, Mountain,



Pacific, Alaska, Hawaii, Berlin, London, Canary Islands, Azores, Rio de Janeiro and Atlantic, thus completing the time circle. The secondary dial may be turned

so as to be set for use anywhere. With this arrangement one can determine local time in any part of the world.

When testing B-eliminators for maximum output with a low-reading milliammeter, the meter should be protected against burn-out by a fixed resistance of 1,000 ohms or more placed in series with the meter.



# AMATEUR MECHANICS



## "Outboard Motor" Pleases Youngsters

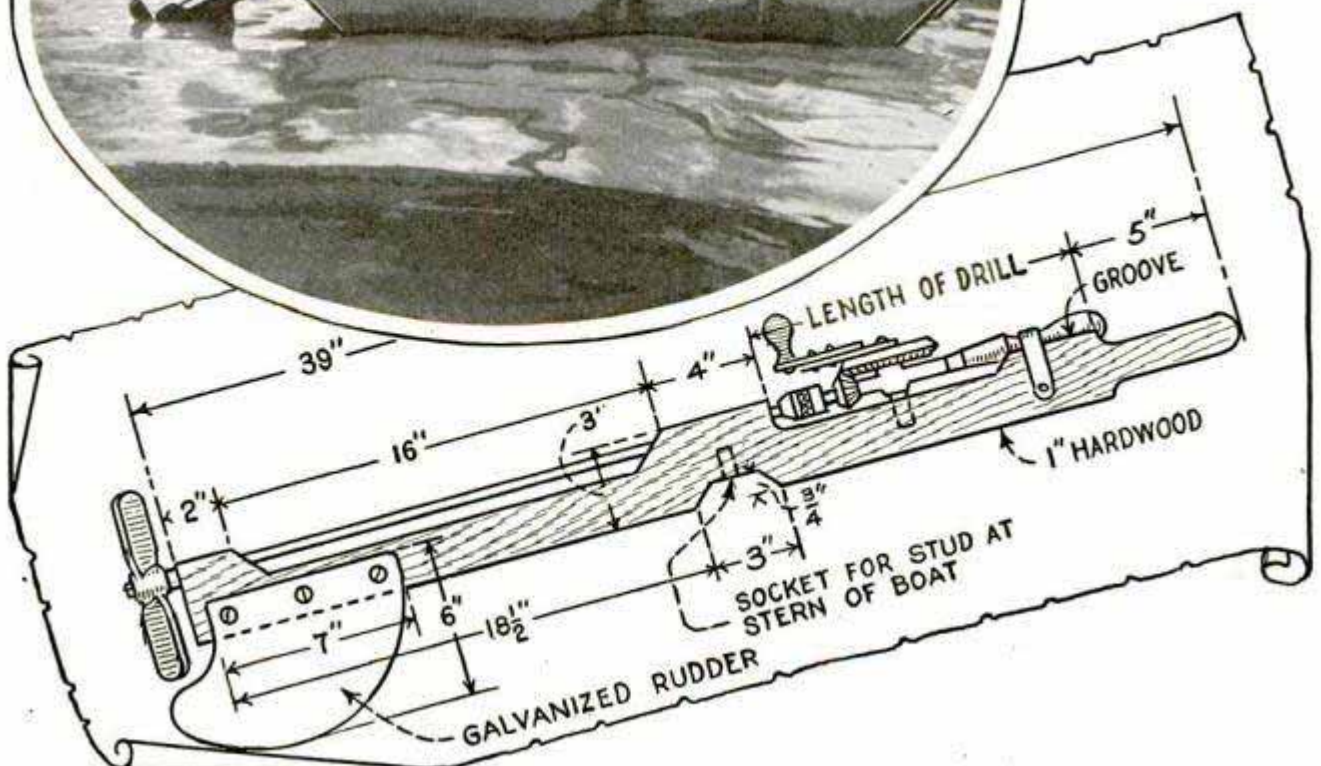
By HI SIBLEY

**R**OWING a boat has always seemed a clumsy and laborious means of getting over the water. Maneuvering in close quarters and on small ponds is awkward with oars. It's tough on unaccustomed backs in a pull against the wind, and your boat loses momentum between each stroke.

Turning a crank is much easier, as with this manual outboard motor. Perhaps one cannot go quite as fast with this device as with oars, but the push ahead is continuous, and a youngster with imagination will get a real thrill from seeing the water churning up behind; besides, he



FRONT END OF PROPELLER  
SHAFT FILED FLAT ON 3  
SIDES, THESE FLATS  
THEN NOTCHED FOR  
CHUCK





can reverse it instantly as in a motorboat.

If you own a hand drill, the job is half done. The drill constitutes your motor, and this outboard is so designed that the drill can quickly be taken out and used for its original purpose at any time. The only alteration—and even this is not absolutely necessary—is extending the crank handle to give greater leverage. In the one illustrated we simply built up an extension from three sections of perforated bar borrowed from a toy-construction set. A flat iron bar will serve even better in case you can drill the holes for the bolts and handle.

The framework should be made from a piece of wood, 39 in. long, 1 in. thick and 3 or  $3\frac{1}{2}$  in. wide. Select some tough wood not likely to break or split. Yellow pine will do.

Saw out as shown in the diagram, and bore the two holes for the propeller-shaft bearings. These bearings, which are sections of brass tube, should be driven in to a snug fit. After being in the water a short time, the wood will swell and hold them securely in place. They do not need to be as long as the holes in the wood.

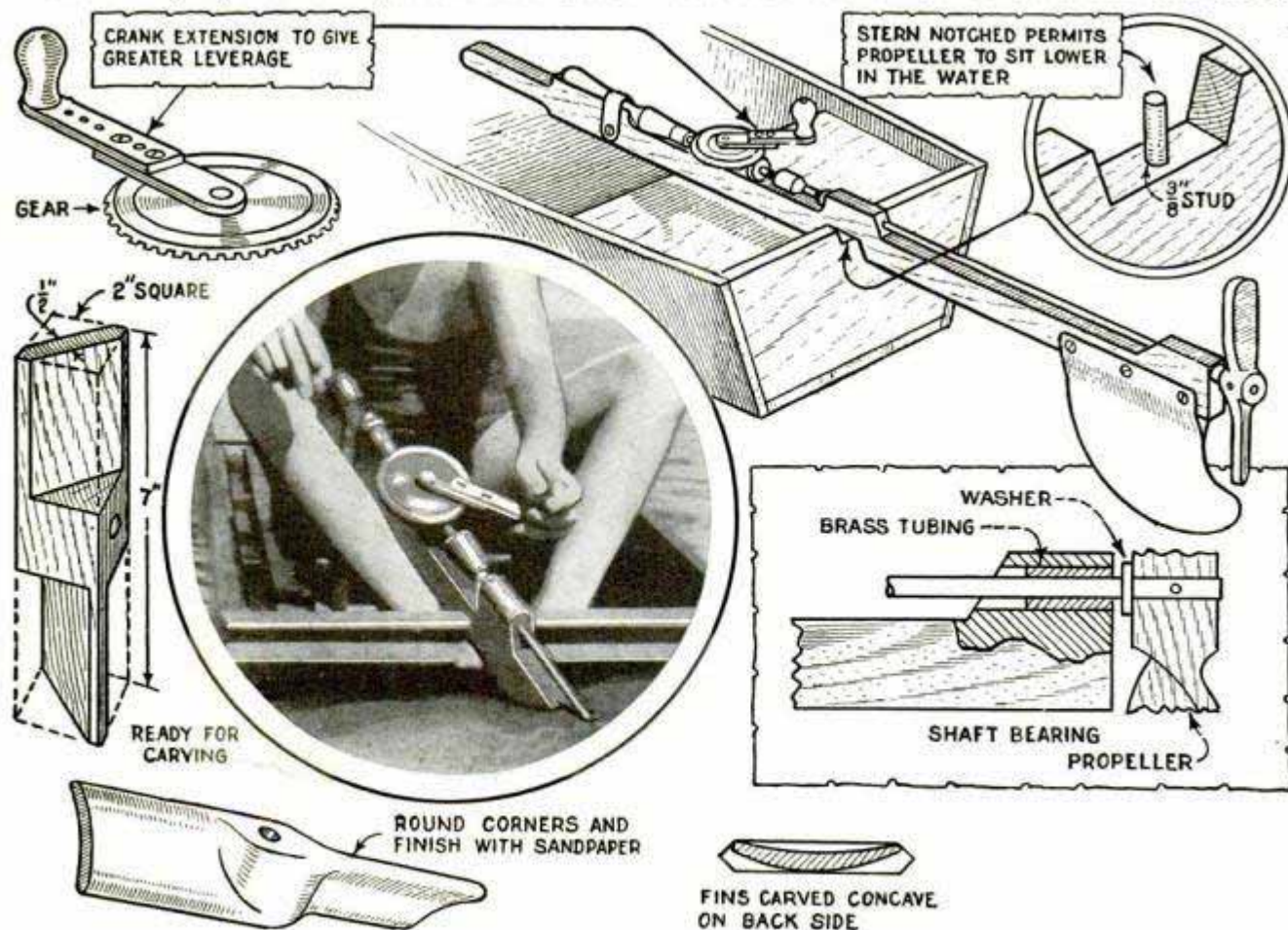
For the propeller shaft, we used a brass

curtain rod,  $\frac{1}{4}$  in. in diameter, since it happened to be the only thing on hand at the time. However, a cold-rolled steel rod,  $\frac{3}{16}$  or  $\frac{3}{8}$  in. in diameter, is recommended, depending upon the size of your drill chuck. The cheapest hand drill, by the way, will suffice for a light-duty motor, its only disadvantages being the noisy gears and unreliability of the chuck, as well as its inability to stand a heavy load. A big sturdy drill will be much better if you care to make the investment.

Cut the propeller shaft to  $25\frac{1}{2}$  in., then flatten the forward end on three sides with a file for a length of about 1 in. In the center of each flat place, file a groove, about  $\frac{1}{16}$  in. deep, running lengthwise. These grooves are to give the three chuck jaws a better grip.

The propeller is much more easily made than might be expected. Use a piece of close-grained wood, 2 by 2 in. in section by 7 in. long. Saw out as indicated by the dotted lines and bore the hole for the propeller shaft. Have this a snug fit, but not too tight, or, in forcing the shaft in, you may split the wood.

With a gouge or curved chisel, make one side of each fin concave and the other,





or forward side, convex. When finished, the fins or blades should be about  $\frac{1}{4}$  in. thick. Whittle the edges all around to about  $\frac{1}{8}$  in. thickness, then round them with sandpaper. With a sharp jackknife, round the hub so there will be no sharp corners or edges, and thus make it smooth and streamlined. Insert the propeller shaft so that the end is flush with the backside of hub. Now carefully drill about a  $\frac{3}{32}$ -in. hole through hub and shaft and insert a nail or steel pin.

Take pains with your painting. If convenient, apply a coat of filler to the propeller and sandpaper smoothly when dry. Two coats of bright red give a lively touch, and they should be followed with two coats of spar varnish. Let each coat dry and sandpaper well after all but the final coat.

Now you are ready to fit the hand drill to the frame. It will be simple if you have the type of drill used by the writer. In this a stud opposite the center of the main gear is set in a hole in the wood frame, and the handle is clamped to a grooved section by means of a brass strap.

If you have selected a nicely grained wood for the frame, leave it in the natural finish, covering with two or more coats of spar varnish.

Cut the rudder, as shown, from a piece of galvanized sheet, as heavy gauge as your snips will handle. Paint the rudder well with bright red, same as the propeller, or a bright green. Give it two coats of spar varnish also, and, when dry, attach to the frame with screws.

The final assembly consists simply in inserting the propeller shaft in the bearings and tightening the chuck jaws over it. If your propeller blades are tilted in the right direction, as shown, the rotation tends to keep the chuck tight, so that after a few revolutions you can reverse under load without fear of loosening the chuck jaws.

We found that by notching the stern board of the boy's little boat, the propeller would sit lower in the water and at the same time be in a more convenient position for the operator. This, however, will not be practicable if the boat at your



disposal is a rented or borrowed one.

You will find the making of this little outboard an absorbing pastime during the spring evenings, and you will then be ready for a cruise as soon as navigation opens. It can be conveniently carried anywhere, and the efficiency of this sturdy little power plant is limited only by the muscles of your arm.

### Cover for Auto-Tire Padlock

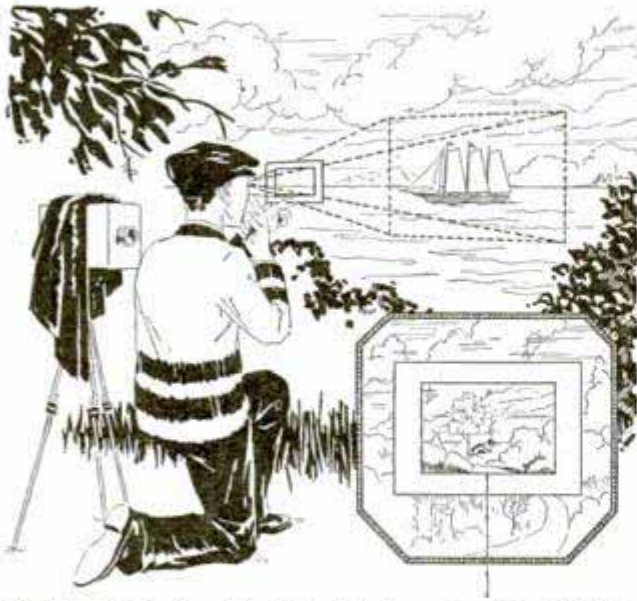
Mud, which gets inside of the padlock used by many car owners on their spare tire, causes considerable difficulty in opening the lock when the tire is needed. To prevent this, a cover should be provided for the lock. It can be made from a piece of thin leather, cut and folded and then sewed up the sides as shown. A coil spring is slipped over the open end, which is then turned back over the spring and



the edge sewed down, imbedding the spring in a hem. The bag is made to fit snugly over the padlock and, when finished, it is turned inside out so that all seams will be hidden. The spring holds

the bag on the lock securely and prevents mud and water from getting into it.—F. J. Wilhelm, Cincinnati, Ohio.





Cardboard Device Used by Photographer for Finding Best Viewpoint

### Finder for Photographs

I have found the illustrated device useful in selecting a viewpoint for any particular landscape or object to be photographed. A card is cut to the same size as the plate or film used in the camera, and a rectangular hole, about two-thirds the size of the card, is cut out with a sharp knife or razor blade. At the inside edge of the opening thus formed a small cord is attached as indicated, and a number of knots are tied at intervals on this cord, the distance from the edge of the hole to the knots being equal to two-thirds of the focal lengths of the various lenses used on the camera. The landscape or object to be photographed is viewed through the opening of the card and the distance of the eye from the frame is varied by holding different knots against the upper part of your cheek, just under the eye, until the frame includes the desired picture. A lens of corresponding focal length is adjusted to the camera. On my camera, I use lenses of  $4\frac{1}{2}$  to  $16\frac{1}{2}$ -in. focus. The outside dimensions of the card enable one to carry it with the plate holders.—W. H. Wilcox, Tacoma, Wash.

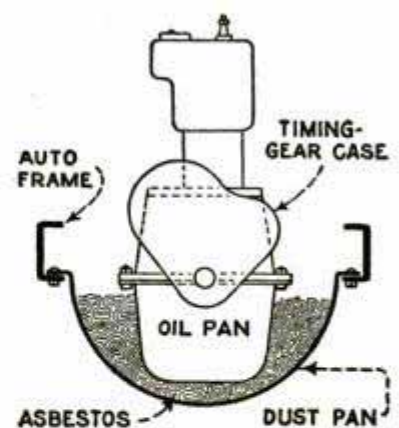
### Dry-Cleaning Mixture

An emulsion of gasoline and water is much used by dry cleaners for removing grease, tar and paint spots from clothing. It is in the form of a thick, white sirup, which evaporates entirely and is not injurious to any fabric or color. This emul-

sion can be prepared as follows: Dissolve, in 1 qt. of boiling water,  $\frac{1}{2}$  oz. of pure castile soap and  $\frac{1}{4}$  oz. of gum arabic. Allow this to cool, and then add 1 oz. glycerin, 1 oz. strong ammonia water,  $1\frac{1}{2}$  oz. chloroform, and 2 oz. sulphuric ether. Shake well, and pour enough of the mixture into a quart bottle to fill it for  $\frac{3}{4}$  in. On top of this pour gasoline to raise the level  $\frac{1}{4}$  in., and shake until creamy. Repeat the addition of gasoline, shaking each time, until the bottle is full. The cleaning mixture will then be ready for use, and may be applied with a rag or with a small brush. If, on adding the first lot of gasoline and shaking, the mixture does not become emulsified, too much gasoline has been added. In this case, allow the mixture to stand for a few minutes and pour off the excess gasoline, which comes to the top. Shake well, and add a smaller quantity of gasoline. When the bottle is half full, larger quantities of gasoline may be added at a time. It is interesting to note that the more gasoline is added, the thicker the emulsion becomes, and if the addition of gasoline and the shaking is prolonged, a semisolid jelly is formed, which will not run from the bottle. Keep the emulsion away from open flames.

### Conserving Motor Heat in Zero Weather

Fitting a shutter in front of the radiator of your car is highly recommended to keep the heat of the motor at an efficient operating temperature, and the pro-



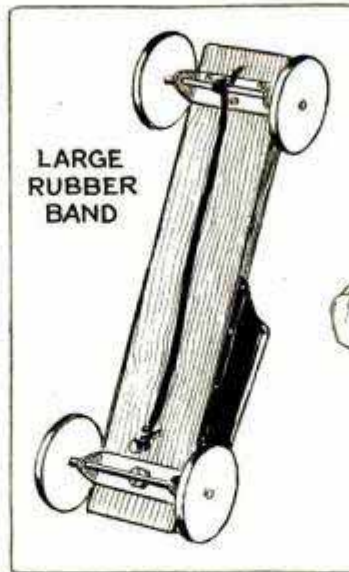
vision of cardboard or asbestos strips inside the lower part of the hood to close the ventilating slots, is also advisable. Besides this you will find that asbestos "fluff," which is used for steam-pipe packing and is obtainable at almost any mill-supply house, provides considerable insulation when stuffed between the dust and oil pans of your car, as shown in the drawing.—R. P. Cole, Paterson, N. J.



### Toy Speed Wagon

Provided with a stout rubber band, this speed wagon will travel at a fast clip for more than 100 ft. One model has covered 250 ft. on a single winding. To make it, get four can covers for the wheels; cut 2 strips from the side of one can, bend the ends over at right angles and punch holes through them to serve as bearings for 2 lengths of wire which serve as axles. Push the wires through holes punched in the exact center of the wheels, and then solder the wheels to the axles.

Cut a narrow board, about 2 ft. long, and fasten one set of wheels and axle to each end. Drive a nail in the underside of the board just behind the front axle, in the center, as shown in the detail. Get a stout rubber band and tie one end to this nail. Then wrap the other end of the band around the rear axle and turn the wheels to wind the band on it. If you stretch the rubber while winding, you can wind it much tighter. Set the wagon down on the floor and let it go. In one case the band was wound so tightly that the wheels would spin, unless a brick was placed on the wagon. To make the wagon run in a curved path, turn the front axle slightly,



Toy Wagon of Simple Construction Driven at High Speed by a Stout Rubber Band



which can readily be done if it is attached by means of a screw driven through the center of the tin strip. You can also add other details, such as a hood, seat, steering wheel, radiator, etc. File all edges down so that they are as smooth as possible, and when you wind the rubber, take care not to let the wheel spin in your hand, for even a smoothed tin edge may make a bad cut.—Dale R. Van Horn, Lincoln, Nebr.

### Flower Stands Made from Barrel Hoops

Wooden barrel hoops can be used for making artistic flower stands like those shown in the drawing. They can be made

Flower Stands of Various Kinds Can Be Made from Wooden Barrel Hoops



To bend hoops without breaking steam or soak in hot.

of various shapes and sizes and, when finished, are given an application of paint to add to their appearance.

### Care of Automobile Doors

When you are oiling your auto, do not neglect the door hinges and latches. Many rattles and squeaks can be traced to door hinges and old anti-rattling devices. Slamming doors too violently is apt to break the door-window glass, or it may spring the door, and it is then almost impossible to prevent it from rattling. For the same reason, it is a good plan to examine the door checks occasionally.

¶ To level rough ground quickly and effectively, drag an iron rail over it, tying each end to a suitable length of chain or rope and attaching it to a tractor.

Philip Ambrosen, 457-37th St., Brooklyn, N.Y.





# How to Refinish

## Finishing with Stain and Varnish

stored to its original state by patching, polishing or the application of an additional finishing coat. It should, of course, also be remembered that the stain finishing of fine furniture calls for the exercise of considerable good judgment, and that those without previous experience in the use of finishing materials should first do some smaller, medium-grade pieces to be sure the results obtained are satisfactory before attempting expensive furniture.

Ordinarily a previously stained piece can be refinished in a darker stain effect with satisfactory results, but wood previously stained dark can seldom be satisfactorily refinished in lighter effects. Red-mahogany stain in particular is very powerful, and it is practically impossible to use any except the very dark stains, such as walnut or brown mahogany, for refinishing surfaces previously finished in red mahogany, as the stain deep down in the wood, which cannot be entirely removed, will "bleed" through and "muddy up" the new finish, so it will not present a very pleasing appearance.

In starting the refinishing of the table, the first step naturally will be the removal of the old finish. This is not a difficult operation, although it is rather a disagreeable one to those who are not accustomed to it. The work is best done with the prepared paint and varnish removers made especially for the purpose. Alcohol is sometimes used, as is also benzol and other solvents, but they do not act so quickly and efficiently as the prepared removers. Lye is also employed, but its use is not advisable, as it is likely to burn the wood and injure it for refinishing. Some people also sandpaper down the old finish instead of using paint and varnish remover, but this is not such a satisfactory method, for it is impossible to sand out checks entirely as long as any of the old finish remains, and to sand it

Be Sure That All Sanding Dust Is Well Rubbed Off Before Starting to Varnish

**I**N THIS issue we are going to take up the extra-fine stain finishing of furniture by removing the old finish and building up the desired new finish by coloring the wood with stain, and then applying finishing coats of varnish. This is the method skilled finishers use in refinishing operations of the highest class.

We will take for an example an end table in the red-mahogany finish which used to be fashionable but now is no longer seen in the best-furnished homes, and change it to the modish brown mahogany of today. In this connection, it is to be assumed that there are only two reasons why the householder will ordinarily want to remove the old finish and build up a new one from the wood. One is to change the effect, and the other that the old finish is in such bad condition it cannot be re-



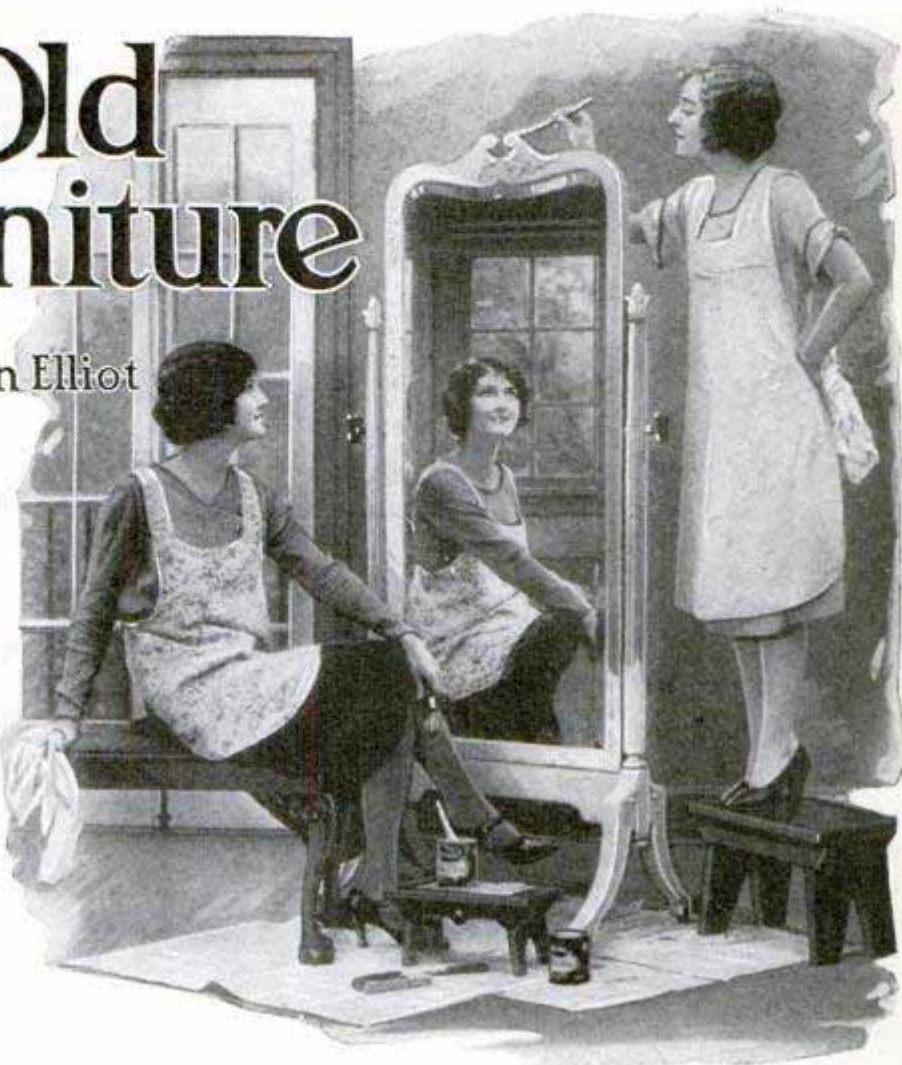
# Your Old Furniture

by  
Berton Elliot

down clear to the wood is a hard job, and a much longer one than the removal of coatings with a solvent remover.

The method of using paint and varnish remover is as follows: Brush a liberal coating onto the surface, being sure to shake the container thoroughly to agitate the contents, immediately before using, and also being careful not to get any of the remover onto any near-by painted or varnished surfaces.

Allow the application of remover to remain on the surface until the old coating is softened, which usually takes about five minutes, then scrape off the softened coating with a putty knife. Carvings, moldings and other hard-to-get-at places may be reached with a small vegetable brush or a piece of steel wool (which should be fine) dipped in the remover. In some cases where the old finish is exceptionally heavy or adheres tenaciously to the surface, a second or third application of the remover may be necessary, but not as a general rule. After the removal of the old finish has been completed, the surface should be thor-



oughly washed with a cloth saturated in gasoline (preferably high-test) or benzine, or, better still, scrubbed out with a vegetable brush dipped in the gasoline or benzine, to remove any remaining deposits of the paint remover. This is extremely

important, as paint removers are ordinarily made with a wax content, which, if left on the surface, will interfere with the drying of the new finishing coats or cause other trouble.

As soon as the surface is thoroughly dry, you are ready to build up the new finish. The first step, as in all finishing, is to sand-paper the surface. While it may seem to be quite smooth,



Applying Rubbing Oil to the Surface When Polishing with Rottenstone





it is always wise to sand lightly before any finishing is started, to take off any nibs or dirt and insure the last degree of smoothness. For fine finishing, only very fine sandpaper should be used (not coarser than 0000). Care should be taken to sand evenly all over the surface, so that the refinishing coats of stain will produce a uniformly even effect. When through, loose particles of sand and sawdust should, of course, be dusted off carefully.

The next operation is the application of the stain. For the home finisher, a stain of the penetrating type is best. Oil stains, although suited for use by the amateur, are only adapted to new wood, as when a wood has once been filled, stained and varnished, its porous qualities are partly destroyed, so that oil stains will not penetrate sufficiently. There are other types of stains which require more skill in application and therefore should be used only by the skilled craftsman. Before starting to apply the stain, a try-out should be made on some obscure part of the table, as it should be remembered that a stain gives somewhat different color effects when used on different kinds of woods, and also varies somewhat accord-

ing to the previous finish and the quantity of stain that may be left in the wood when the old finish is removed. If the effect is found to be too dark, the stain can be lightened somewhat by adding a little turpentine.

The application of the stain itself is a comparatively simple operation. One coat only should be applied, as evenly and uniformly as possible, without covering any part of the surface twice. If any places are skipped, touch them up with a small brush. After staining, the surface ordinarily should not be sandpapered, as it may cut through the color in places.

The next step is the application of filler, if the piece is of one of the open-grain woods, such as oak, walnut, mahogany, chestnut, etc. This should be done after the stain is thoroughly



Top, Sopping On the Remover; Center, Staining the Piece; Below, Rubbing Off Filler across Grain

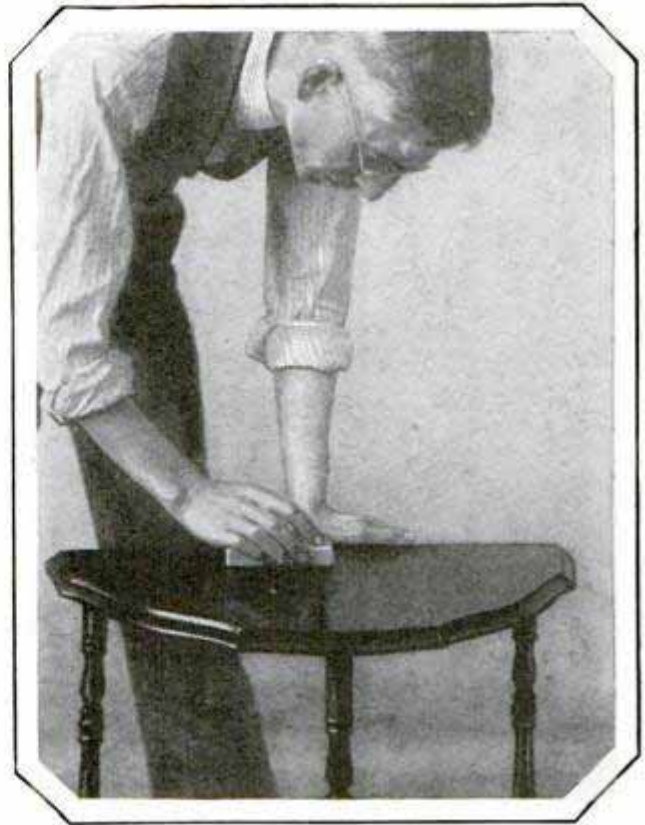


dry, usually the following day. While the wood, if of the open-grain type, was undoubtedly filled when the piece was originally finished, the application of the paint and varnish remover usually removes some of the filler as well as the finish.

The function of the filler is to fill the pores of the wood, so that the following varnish coats do not sink in, and to level the surface for the finishing coats. Ordinarily paste filler is used for open-grain woods, this material coming in thick paste form, to be reduced with benzine or turpentine to about the consistency of thick cream immediately before use, and being made in different shades, such as natural, oak, walnut, mahogany, etc. The color of the filler should correspond with the effect desired.

Filler is applied with a brush, and, within a few minutes after application—as soon as it commences to set, which is indicated by its turning flat—is wiped off across the grain with a cloth, rubbing vigorously until every bit of surplus is removed, the last stroke or two being with the grain. The filler should not be applied on too much surface at a time, for if it sets hard before you get it wiped off, it will be hard to remove, and this must be done or the finish will be disfigured with grayish streaks. In case it should get too hard, it will have to be washed off with turpentine or benzine, or perhaps taken off with sandpaper dipped in turpentine or gasoline. When the filler has dried for 24 hours, the surface should be sandpapered very lightly, and dusted clean.

The next operation is the application of a thin coat of shellac, to seal in the stain, which would otherwise bleed through the finishing coats of varnish. Shellac, being made with alcohol and containing no linseed oil, is impervious to the attack of the strong dyes used in penetrating stains, which attack linseed oil. For use over brown mahogany, walnut and the darker shades, orange shellac is recommended, as its yellowish cast helps to bring out the true beauty of the effect. (For light-stain effects, white shellac should be used.) After the shellac is dry—it dries very quickly and becomes thoroughly hardened in about two hours—it should be sandpapered lightly to a smooth surface, but not too much, so as to sand it off entirely.



Rubbing Down between Coats with Fine Sandpaper on Felt Pad

After dusting clean, you are ready for the finishing coats of varnish.

For the highest-class work, three coats of high-grade interior-finishing varnish (gloss) should be applied, allowing three, or preferably four, days for drying between coats, and rubbing the first and second coats with No. 0000 sandpaper (or, for the best possible job, with pumicestone and water) and the final coat with pumicestone and oil, to the desired effect. Full directions for pumice rubbing were given in the December, 1928, issue of this magazine, and detailed information regarding the technique of applying varnish in the March, 1929, issue.

A high polish of piano finish is sometimes given fine furniture by rubbing with rottenstone (which can be obtained at paint or drug stores) and oil, after the pumice rubbing is completed. Simply rinse off the pumice with clear water, and begin rubbing with rottenstone and oil, using a very soft cloth or soft rubbing felt, and proceeding over the entire surface until a beautiful high polish is produced. Then rinse off with clear water and dry with a chamois or soft cloth. In case any places are found to be dull after the clean-up, they should be rubbed to





match the rest of the surface; then the entire surface is given a few strokes to produce a uniformly even effect, and cleaned off thoroughly when through.

From the foregoing, it will be seen that the refinishing of an old piece of furniture in a fine stain finish is really quite a simple operation for anyone who likes handcraft. There are just these five operations: taking off the old finish; applying the stain; applying the filler; applying the varnish coats, and rubbing (and polishing if desired).

Then, if desired, a last finishing touch can be added by the application of transfer decoration in one of the medallion patterns or wood-inlay effects designed especially for use on stain-fin-

ished furniture, and you will have a piece that compares with the mahogany or walnut-finish furniture shown in the stores.

When using the decalcomania transfers, it is, of course, necessary to choose a pattern that will imitate a wood inlay, that is, one that resembles the background as closely as possible. Bright, highly colored transfers, while quite suitable for painted, lacquered or enameled furniture, are entirely out of place on stained and varnished pieces. There are many transfers, however, that resemble inlay and marquetry work, in comparatively dull colors, and any good paint house can offer

a selection that will enable the amateur finisher to suit his walnut or mahogany pieces. Take care to place the transfer accurately. If it is off center or not straight, it will mar the effect of the most careful finishing.



Scraping Off Softened Varnish with Putty Knife after Sopping with Remover

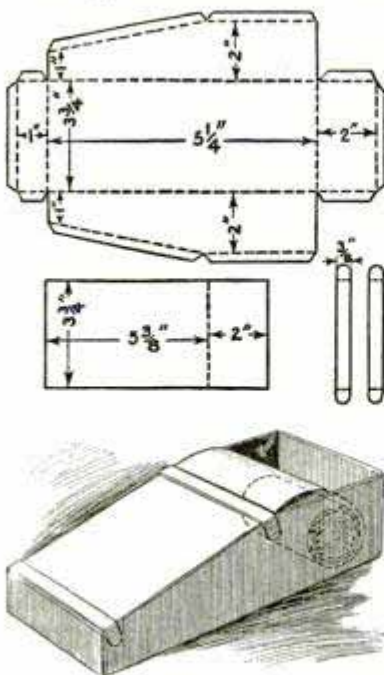


### Removing Auto Wheel without a Puller

If you have to remove a rear wheel of an auto and there is no wheel puller at hand, jack up the opposite wheel, setting the jack at a slight outward angle so that the weight of the car pulls on the axle of the wheel to be removed. Take off the hub cap and the hub nut, reverse the nut and screw it on the shaft until it comes flush with the axle, and tap the axle with a hammer until the wheel comes loose. The nut is reversed so that no damage will be done to the castellations. I have found this method successful with the tightest wheels.—K. E. Corliss, Langley, Wash.

### Memorandum Pad and Holder

One of the most useful types of memorandum pads is one that incorporates a roll of paper, which can be torn off at any length desired. It is easy to make one from a piece of tin, brass or galvanized sheet iron, the dimensions and shape of which are given in the upper detail. The dotted lines show where the metal is bent. Two  $\frac{3}{8}$ -in. metal straps are soldered onto the sides at the top and bottom of the pad holder as shown, a slight space being left between them and the holder. In use, a roll of paper is laid in the box section and the end pulled between the top and the straps. If desired, the holder may be given a coat of lacquer to improve its appearance. All the sharp edges, are, of course, smoothed with a file or piece of sandpaper. The used paper is torn off by pulling against the bottom strap, as on a wrapping-paper roll.—H. J. Wubbold, Salisbury, Md.



You Can Prevent Loss of Your Motor by Tying It to the Boat with a Six-Foot Rope

### Preventing Loss of Outboard Motor

Some time ago, when attaching an outboard motor to a boat in rather rough water, I overbalanced with the result that the motor and myself had an untimely bath. It was quite difficult to recover the motor in 15 ft. of water, and I decided to prevent a similar accident by fastening a 6-ft. length of rope to the motor before lifting it out of the boat. A harness snap, fastened to the shank of the wingbolt of the motor clamp, provided a quick means of attaching and detaching the rope. Of course, the other end of the rope was securely tied to the boat. Another simple method of preventing the loss of the motor, due to vibrations loosening the screws clamping the motor to the boat, was found successful on a Wisconsin lake. A piece of  $\frac{1}{16}$ -in. sheet copper was bent to fit over the transom of the boat, and screwed to the wood. The motor fits over the copper in the usual way, but the clamp screws get a good grip on the soft metal, and do not seem to become loose. A combination of both methods described should prevent any possibility of loss or trouble.—Dick Cole, Los Angeles, Calif.





# Novel Effects *from*

In making this checkerboard, the first step is to procure a sheet of heavy white cardboard or bristol board, 16 in. square. Now, measure in 2 in. from each edge of this square and rule another square to form a border, 12 in. along each side. Divide this inner square, with ruler and T-square, into 64 small squares, as shown in Fig 2, each of these smaller squares measuring exactly  $1\frac{1}{2}$  in. to a side.

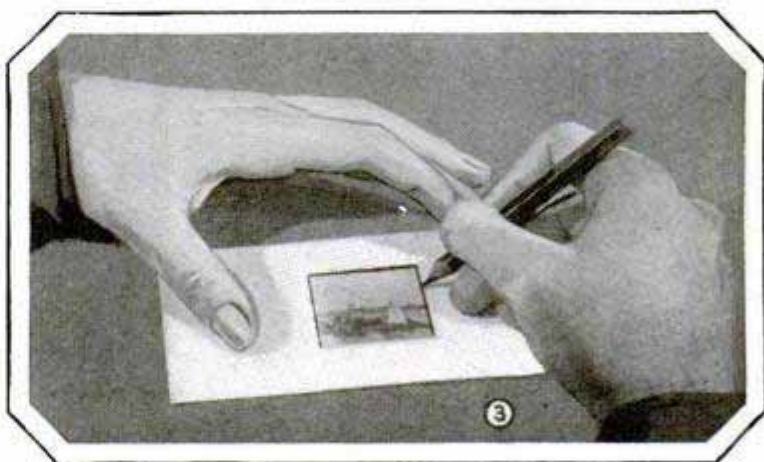
That finished, take a small piece of cardboard, and in the center of it cut out an opening  $1\frac{1}{2}$  in. square. This is the "finder." By placing it in various positions over a snapshot, you are enabled to select the most picturesque or interesting bit of the picture, and after finding it, you should outline it by running a pencil around the inner edge of the cardboard square, as shown in Fig. 3. Your snaps, of course, should be of the  $2\frac{1}{4}$  by  $3\frac{1}{4}$ -in. size, at least, so that there will be plenty of detail in the pictures, although  $1\frac{1}{8}$  by  $2\frac{1}{2}$ -in. "vest-pocket" snaps will do in a pinch. Outline 32 of your best snaps in this manner, and then cut out each of the squares with a paper cutter or a pair of sharp scissors, as shown in Fig. 4. After cutting the snapshots, take a pen, and, filling it with black ink, run a

**O**F COURSE you have a camera.

Every summer you go on a grand spree of picture taking—snaps of the fish you catch, artistic and unartistic photographs of your friends and relations, a beautiful bit of scenery; in fact, everything from a mud turtle to a midsummer sunset is fit material for your black box. And then, at the end of an arduous summer, you take the vast collection, look them over for the last time, and then plank the whole bunch in a shoe box with the rather vague intention that some day you will take them out again and put them in a pretty album where they can yellow away to a decent old age with some pretense at luxuriousness.

That's the average amateur photographer. Like a lot of others, you take a picture and that ends it, and you never give a thought to the wonderful decorative effects that can be obtained from the camera and your old snapshots.

But here's what you can do: Go over your accumulation of snapshots. Among them you will, of course, find two or three dozen or more pictures which you especially like, and from these a photographic checker or chessboard, as shown in Fig. 1, can be made.



black border around the outside of each square, as shown in Fig. 5.

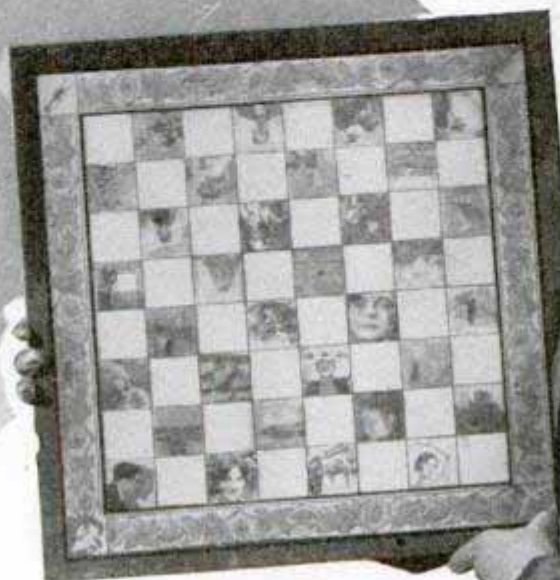
The next step is to mount the photo-



# your Old Snapshots

by  
Sam Brown

①

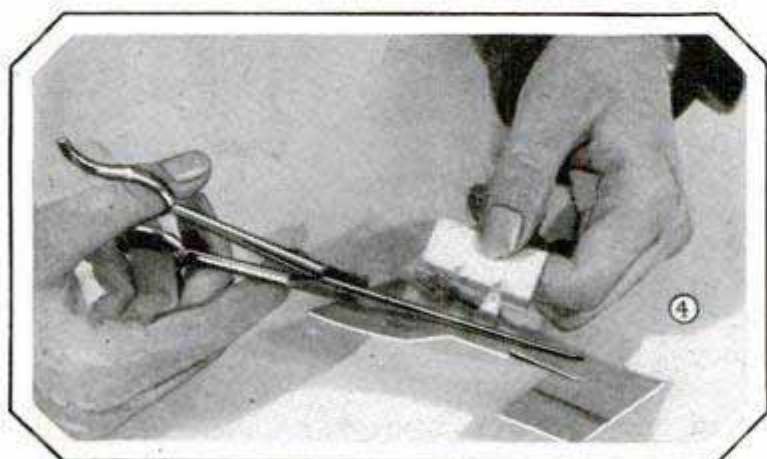


graphic squares on the ruled sheet of cardboard. In doing this, 16 of the pictures should face one way and 16 the other, so that each player will have 16 pictures facing in his direction, as shown in Fig. 6. The final step in the construction of the checkerboard proper is the border. If you have the necessary artistic ability, a simple pen-and-ink border can be drawn around the framework of photographic squares; if not, the simplest method is to paste a narrow strip of suitable wallpaper border around the edge, mitering the corners so that the edges will fit nicely together. A small, diamond-

the same size as the cardboard and paste or glue the checkerboard to one side of this. Cut a piece of heavy glass to exactly the same size as the board and place this over the top of the layout of photographic squares. Bind the edges of the three assembled pieces with a 2-in. strip of colored felt, cutting the felt at an angle every 16 in., as shown in Fig. 8, so that it will make a neat joint at the corners, as shown in Figs. 8 and 9.

Almost finished! It remains yet to glue a square of felt to the bottom of the board so that it will not mar the surface of the playing table, and then—your move!

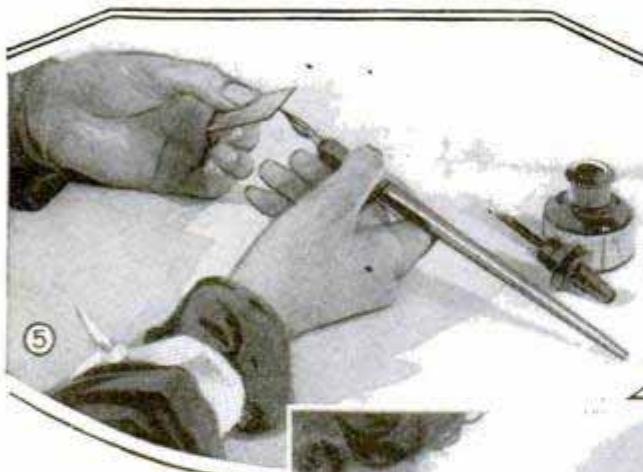
A neat top for a card table, as shown in Fig. 10, can be made in a similar manner, and here the scope for artistic grouping of large and small pictures is considerably enlarged. The various steps in the construction of the photographic card table are much the same as those used in making the checkerboard. If desired, the photographs can be pasted directly to the surface of the table (this should be light in



shaped or circular photograph can then be pasted in each corner, as in Fig. 7.

Now cut, from  $\frac{3}{8}$ -in. lumber, a piece of





puzzle is finally assembled, as shown in Fig. 12. This particular puzzle was made from an enlarged snapshot of the Harding Memorial, at Marion, Ohio, but any other type of picture—landscape, personal, marine, etc.—can be used to equal and often to greater advantage. A small boy would surely appreciate puzzling out his own picture over assembling a photograph of a locomotive, of a beauty spot in the Grand

color in order to contrast) instead of to a sheet of cardboard, although the latter is the better method. The binding for the card table can either be felt, as for the checkerboard, or narrow brass strips (such as are used for the edges of oilcloth-covered tables), bent at right angles, can be used to hold the glass in place.

Something entirely different is the photographic cut-out puzzle. Take one of your best snaps and have it enlarged to about 7 by 10 in. Mount this enlarged picture on one side of a thin slab of wood, preferably three-ply veneer, so that it will stay flat, using a good grade of glue to hold the photograph firmly in place. After the glue has set and dried, take a coping saw or a fretsaw and cut the mounted photograph into small sections, as shown in Fig. 11. This can be done haphazard or from a penciled pattern, as your fancy dictates.

In cutting the photograph, downward pressure should be used only on the outward stroke of the saw, as a heavy, downward pressure on the backstroke tends to give a slightly ragged edge to the picture which will mar its appearance when the



canyon or striking scenic view elsewhere.

Still another phase of decorative photography from your old snapshots is the making of transparencies. A transparency is a positive film; that is, the snapshot film appears like a snapshot photograph made transparent. The varied uses for these transparencies are legion, but, perhaps, in the making of lampshade decorations they are most popular.

The how of making them goes like this: Take about six of your favorite negatives and retire to a room which is entirely darkened with the exception of a dim light furnished by a red electric bulb or



by an ordinary white bulb masked with red paper. The red paper that films are wrapped with in the original package makes a good safe light. In this dark room, take a roll of film of the size that fits your camera and unwind it. After procuring the length of film, cut it with scissors into six small pieces of a size to fit your negatives, as shown in Fig. 13.

Now, take one of the pieces of the new film and place it on a piece of black velvet, felt, or dead-black paper. Put the negative film over this, and, on top of the two, a clean piece of glass. That done, take an ordinary match. Light it. Hold it about  $2\frac{1}{2}$  ft. away from the glass, as shown in Fig. 14, and



match. The match should be waved slightly to and fro as the exposure is being made, and this exposure should be of no longer duration than the match-head flame mentioned, as further exposure will "burn up" the film.

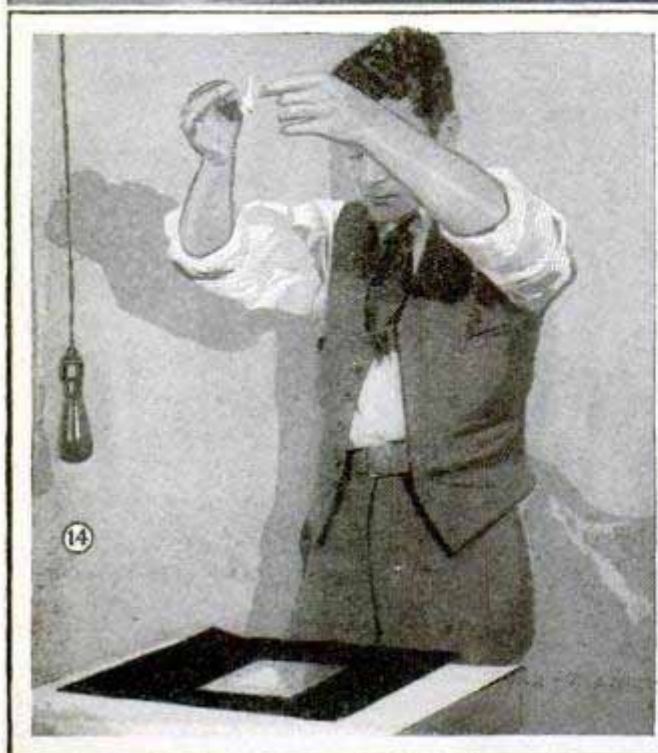
What happens is quite obvious. The light penetrates through the light



allow it to burn for the duration of the initial flame caused by the head of the

and dark portions of the film negative and makes a positive impression on the lower







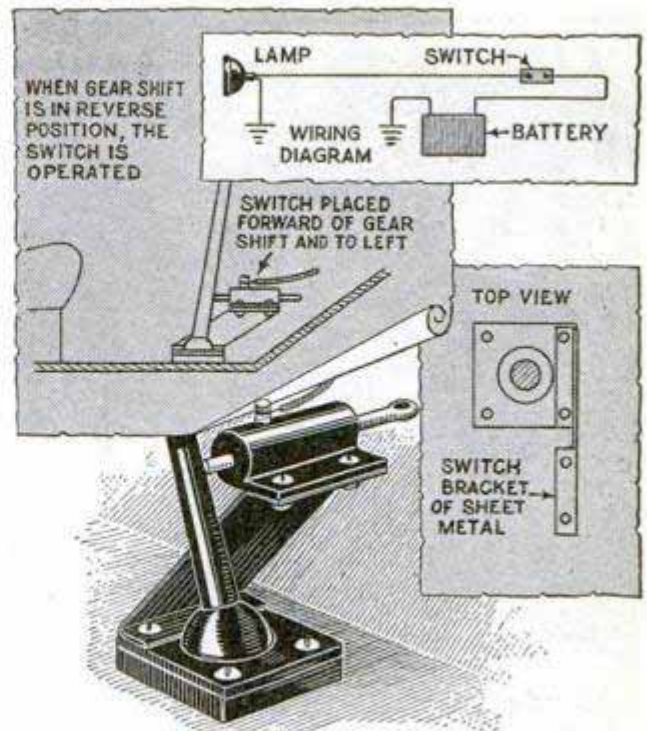
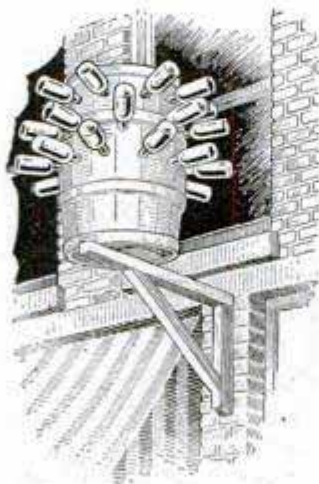
film. This positive imprint, when made in this fashion, is technically known as a transparency. After making the usual six exposures, place the prospective transparencies into a black box and take them to your photographer. He will develop them in the usual manner, producing positive films like the one shown in Fig. 15.

The practical value of these films lies in the fact that their transparency makes them quite suitable for mounting on lampshades and side-bracket lights.

The first step in mounting them is to cut out the necessary area from a plain undecorated lampshade, or perhaps you can find a parchment lampshade with a design which readily permits the cutting out of some portion to allow the insertion of the picture. After cutting out the framework, trim the transparency to the required size and paste it in place on the inner side of the shade. A piece of transparent paper should be used as backing, in order to give the picture more brilliancy. Some idea of the effect can be gained by the illustrations in Figs. 16 and 17, although the full delicacy of the transparency is something far too illusive to be reproduced on the printed page. The effect can be varied by using thin colored paper to back up the transparencies, or thin colored celluloid, the color being chosen to suit the subject.

### Novel Sign for Roadside Pop Stand

The proprietor of a small roadside pop stand, just outside of a small Nebraska town, has a novel advertisement which is especially attractive at night. It consists of a 5-gal. keg bored to admit the ends of empty pop bottles as shown. A 150-watt electric lamp is provided inside of the keg, and the open end of the keg is closed. At night, when the light is turned on, the bottles let the light through, making the odd sign visible from the road.



Back-Up Light Which Works Automatically When Car Is Reversed

### Installing a Backing Light on the Car

Any motorist can provide a back-up light that works automatically when the gear-shift lever is thrown into reverse. Get an ordinary stop-light switch and mount it on a bracket, which is in turn attached to the transmission cover as shown. The switch is so located that the gear-shift lever bears against it and closes the circuit. A 4-in. spotlight is mounted at the rear in a convenient position. The small diagram shows the method of connecting the lamp and switch in the circuit. —G. A. Luers, Washington, D. C.

### Soldering Iron Removes Putty

Putty can readily be removed from old window sash in which the pane has to be renewed, by means of a red-hot poker or hot soldering iron. An electric iron with a wedge-shaped point is the best for the purpose as it remains hot. After getting the point down to the wood it can be pushed along, peeling the old putty clean without damaging the wood on the sash. —Mason Barnard, Worcester, Mass.

Half of an old flour barrel, cut lengthwise and laid on the ground with stakes driven in at the open end, makes an excellent coop for a brood of young chicks.





Small Mirror Attached to Swivel Joint on Handle Helps Inspection of Hidden Places

### Handy Mirror for Inspecting Corners

Machinists and shop workers often find it necessary to inspect a corner which is out of the line of vision and can only be seen by the use of a mirror. In such cases a small mirror taken from a cosmetic compact and attached to a handle so that it can be adjusted, will be found "just the thing." Remove the mirror from the lid and solder a ball-and-socket joint to the outside edge of the lid. Joints of this kind can be found on gas-throttle rods and distributor rods of autos, and can be picked up for a few cents at any auto junk yard. Tighten the socket on the ball until it moves rather stiffly. Screw a piece of the rod into the joint and attach a wooden handle, about 7 in. long, so that the complete handle will be 10 in. long. When entirely finished, replace the mirror. Such a tool will be found useful for inspecting corners inside of tanks and boilers with a flashlight for illumination; for checking timing gears without removing the radiator, and for inspecting and timing a magneto without removing it.—C. Neiper Bruce, New Castle, Pa.

### Quickly Made Soldering Acid

Preparation of soldering acid by dropping pieces of zinc into muriatic acid until all bubbling has ceased, which indicates that the acid has been properly cut, takes a long time and is more or less messy. An equally effective flux can be made from a few cents' worth of zinc chloride mixed in

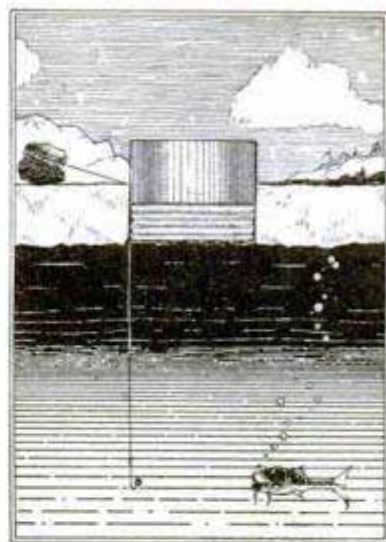
water to make a saturated solution. The flux thus made is ready for use as soon as it is mixed. As the salt is extremely deliquescent it should be kept in an air-tight bottle.—J. S. Hagans, Chicago, Ill.

### Warning Signal for Low Beam in Cellar

There are quite a number of cellars in which the center beam is lower than the joists, and no matter how careful you are, you occasionally will bump your head against it painfully. After this had happened to me a number of times, I decided to prevent repetitions by providing a warning signal that I would see when approaching the beam. I had noticed that most people walking down into a cellar have their eyes fixed on the floor and therefore I got a paintbrush and some black paint and marked a line on the floor directly under the beam. When I catch sight of the line, I always remember to stoop.—J. A. Dowie, Alexandria, Va.

### Fishing through the Ice

When fishing through a hole in the ice the hole is likely to freeze over during the night unless it is covered. Sometimes a piece of paper or cardboard is laid over the hole and this is covered with straw or hay, but the disadvantage of this method is that, unless it is securely weighted down, the straw may be blown away. A better method, which



I have found successful, consists in setting a piece of corrugated cardboard, roughly shaped to form a tube, into the hole and then filling the top of the tube with straw or hay. A little water applied to the edge of the ice and to the outside of the tube will soon freeze and hold it securely in position.—Dale R. Van Horn, Lincoln, Nebraska.



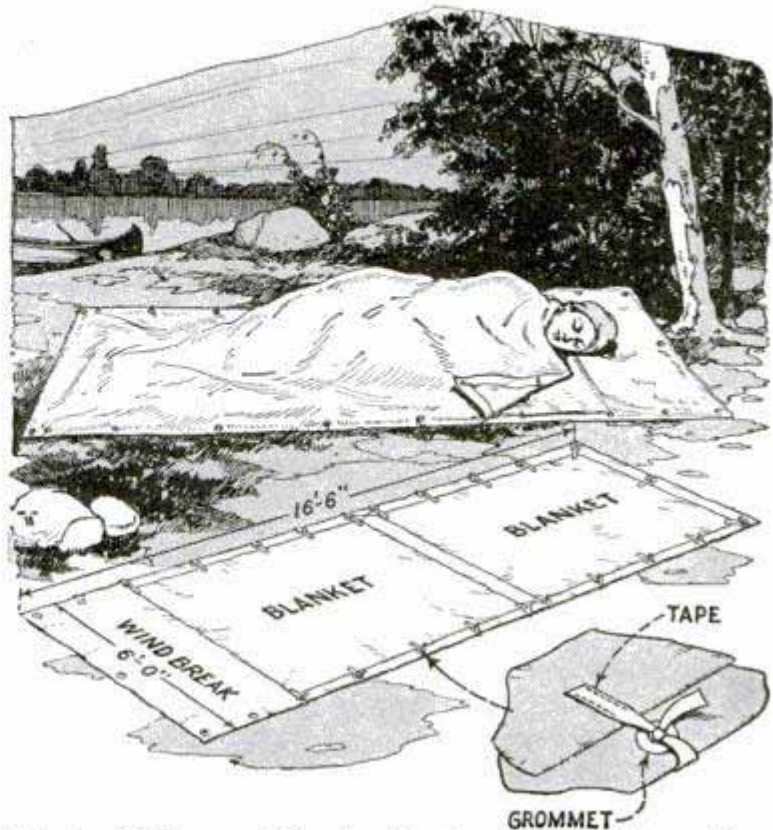
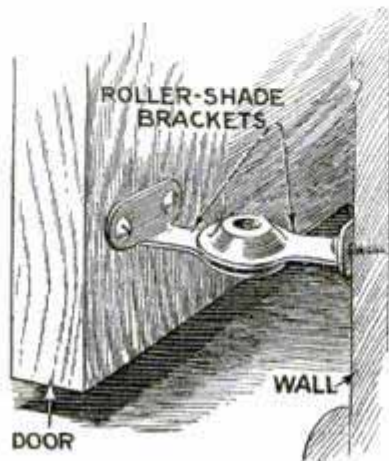
### How to Grow Dwarf Trees and Shrubs

Dwarf trees and shrubs of the Orient are famous the world over. If you enjoy gardening or experimenting with such trees and shrubs, here is a simple method of growing them in your own home. Carefully remove the pulp from a half grapefruit or large orange. Let the peel dry to some extent and then apply a single coat of shellac or varnish on the outside. When dry, fill with the finest and richest leaf mold you can get. Rich fertilized earth will do in a pinch. In the center of the shell, plant a tiny seedling of the tree or shrub you wish to dwarf. Set in a sunny place and water occasionally. As the seedling grows, the roots will eventually pierce the sides or bottom of the fruit-skin pot. With a sharp knife, or scissors, trim each projecting root flush and apply varnish or shellac on the wound. Repeat this operation for a few months and then transplant the tree to a pot or jardiniere of suitable size. Pine trees, orange, lemon and quince trees are the easiest to work with, although there are countless varieties suitable for experimentation.—M. W. Meier, Langley, Wash.

*The Pirate's Lair*

### Simple Door Holder

Two shade-roller brackets, one attached to the baseboard and the other to the door so that they will engage as shown in the drawing, will be found efficient as a door holder. The concavity of the brackets and their smooth edges, cause them to engage easily when the door is pushed open, and similarly to slip apart readily when it is closed.—R. Wailes, Bethesda, Md.



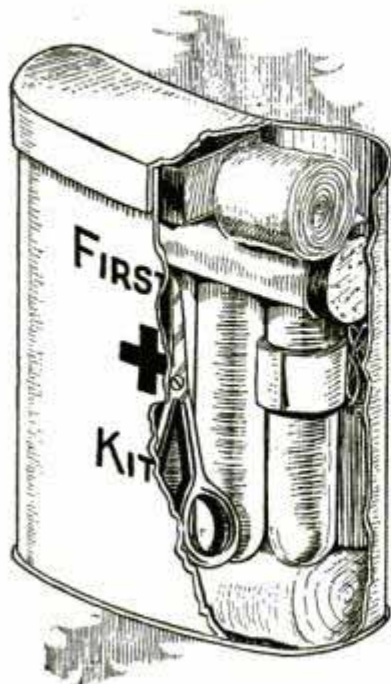
Wind and Waterproof Sleeping Bag Can Be Made from a Piece of Canvas and Two Blankets

### Combination Shelter and Sleeping Bag

When one does not feel justified in purchasing a sleeping bag, a good substitute can be made cheaply and without much work. The materials needed are one piece of duck about 6 by 16½ ft., the weight being determined by the user according to his needs for shelter, and 2 doz. brass grommets with ½-in. holes. Also get a few yards of good stout tape, thread and needles. Space the grommets about 15 in. apart on the long edges of the canvas. Then sew 1-ft. lengths of tape to the edges of your camp blankets, spacing them to match the grommets in the canvas. It is a good idea to have the lengths of tape sewed on by machine. In use, the canvas is laid down flat as shown in the drawing. The blankets are laid on it, and the lengths of tape are tied to the grommets. Fold one blanket over the other and there will then be exactly 2½ ft. of canvas projecting at the head end of the bed thus formed. Tie up one edge of the bed all the way, using heavy fish-line, rove through the grommets back and forth from end to end. This will make the edge practically windproof. The other side is similarly tied, halfway up or entirely.—Dick Stafford, Boulder, Colo.



### Pocket First-Aid Kit



Handy and compact, features which are appreciated by hunters and campers, are the requirements of a pocket first-aid kit. I have found no better container for such a kit than a small tobacco can of the kind shown in the drawing, which can be obtained al-

most anywhere. Give the box two coats of white paint and, if desired, paint a neat red cross on one side. Have the druggist put up the following items in slender 2-drachm tubes: aromatic spirits of ammonia; soda-mint tablets; iodine or mercurochrome; a saturated solution of permanganate of potash, which is used for insect bites and stings; 10 drops of oil of cloves in sulphuric ether, this being used as a toothache remedy; a small roll of adhesive tape, removing the tape from the container and filling the latter with zinc oxide which is used as a burn ointment; a roll of 2-in. gauze; a small package of absorbent cotton and a square of surgeons' lint, which is sold in waxed envelopes about 6 in. square. To assemble the kit, take about half of the absorbent cotton and place it, tightly rolled, in the bottom of the can. On this stand four of the tubes vertically. Place a small pair of scissors between the tubes and the side of the can. Add some rubber bands and toothpicks and the surgeons' lint. A small card or paper, containing straight pins and some small safety pins, besides a needle and thread, is then inserted. A pair of tweezers can also be accommodated. On top of the tubes lay the tube of soda mints on its side, and above this place the tin containing zinc oxide, and about half of the roll of gauze. A small piece of soap and the tape can then be fitted in a corner. Be sure that the

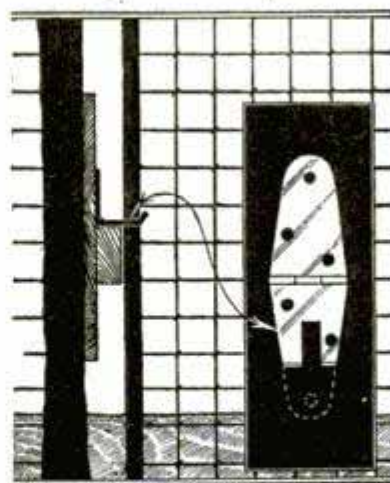
corks on the tubes are all tight. This kit is the result of fourteen years' experience. —Harold J. Boyd, Orlando, Fla.

### Enlarging Small Negatives

Amateur photographers who enlarge small negatives and find that the grain of the gelatin emulsion is objectionably magnified in the process, may counteract this trouble by simply immersing the negative in a liquid which has nearly the same refractive index as the negative and the base. Such a solution may be carbon tetrachloride, benzene, turpentine or glycerin. In a horizontal enlarger these solutions should be used in a tank, made by clamping a strip of soft rubber between two sheets of glass, or in a vertical enlarger a clear glass tray can be used. A simple method is to sandwich the negative between two glasses after covering both sides with a thin coating of glycerin. If the enlarger radiates much heat, it is best to treat the film with a hardening solution, such as formalin, before immersing.

### Hinge Makes Good Gate Latch

Any large strap hinge can be converted into a good gate latch. With a hacksaw or cold chisel cut off one end as indicated by the dotted lines, and recess the remaining portion so that it is wide enough to fit over the gate frame. Screw the



hinge to the fence post as shown, and nail on a block to keep the latch end horizontal. Bend the ends of the latch section upward a trifle so that it will slip into its locking position more easily after it

has been lifted to release the gate. If the gate is required to swing in one direction only, a stop block may be nailed onto the post, and an unslotted hinge can be used in practically the same way with just sufficient clearance between it and the stop block to accommodate the gate frame.

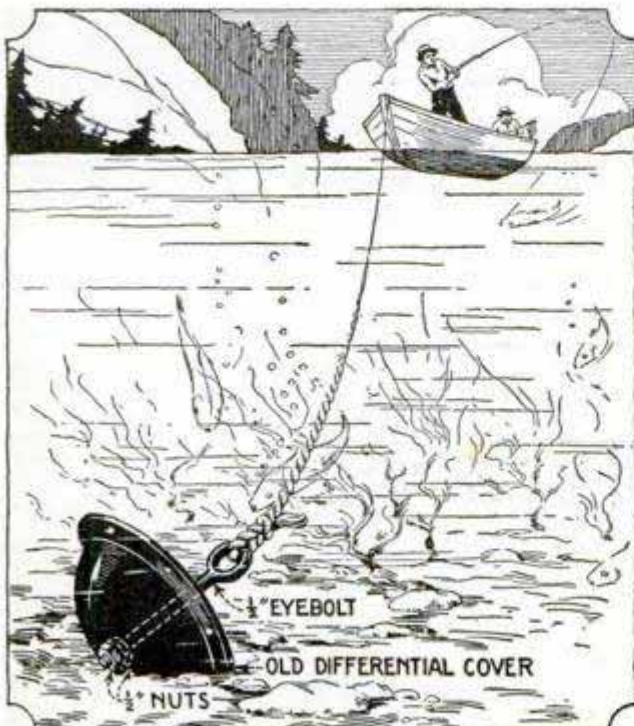


### Using Gasoline Stoves and Lanterns

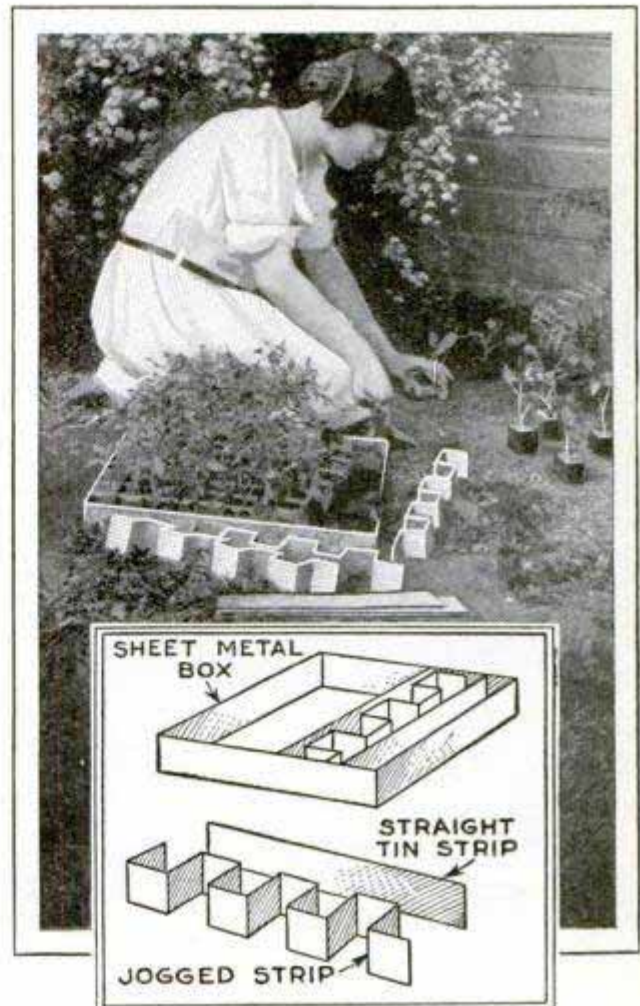
Gasoline treated with lead tetraethyl, so-called "ethyl gas," cannot be used instead of "straight" gasoline in stoves and lanterns. Exhaustive tests seem to indicate that ethyl gas relieves the knock in a motor by retarding the explosion, and many users think that it is a gas of exceptionally high-test quality. Gasoline, however, merely holds the lead tetraethyl in solution in the same way as salt is held in water. When the gas is vaporized in the generator of a gasoline stove or lantern, a solid residue is left, which quickly plugs up the orifice in the generator tip. Then the stove ceases to burn. Campers who siphon fuel from their auto tanks should be aware of this.

### Bell Anchor for a Small Boat

An old differential-housing cover plate, fitted with an eyebolt as shown in the sketch, makes an excellent bell or mushroom type of anchor for a small fishing boat. This anchor does not depend on its gross weight to hold a boat. It digs into the sand, gravel or mud at the bottom and is therefore more effective than a heavier plain-weight anchor. When drawn to the surface, its accumulated contents can be rinsed out before lifting it into the boat.—Dick Cole, Los Angeles, Calif.



Effective Bell-Shaped Anchor Can Be Made from Old Differential-Housing Cover Plate



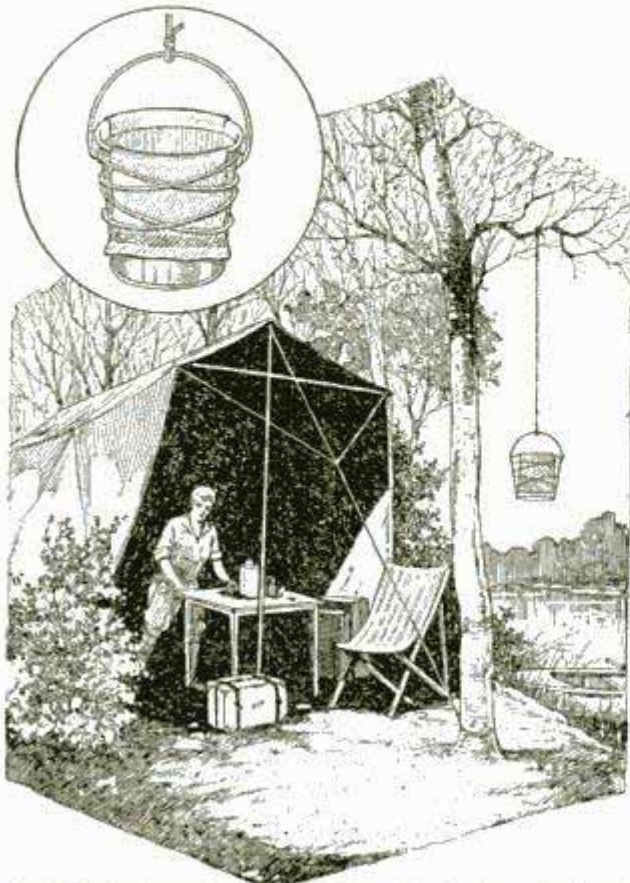
Convenient Transplanting Box Consisting of Jogged Strips of Sheet Metal

### Making Transplanting Easier

A sheet-iron box, with removable partitions forming a number of compartments, will facilitate transplanting. For ordinary plants, make the box 3 in. deep and from 20 to 27 in. square, depending on the size needed. For the partitions, get strips of sheet metal and bend them at 3-in. intervals as shown, first to the right and then to the left. These bends should be true right angles so that the strips can be slipped out when necessary. On each side of the jogged strips straight strips are provided. Fill the compartments thus formed with rich earth and plant the seeds. When the plants have reached the desired size, transplant them. Remove a whole row, which can be conveniently done because of the jogged strips, and it is then an easy matter to separate the individual plants.

☞ When lighting matches in the wind, spread an envelope by pressing on the edges and use it to shield the flame.





Good Substitute for Water Bag Made from Pail and Towels

### Substitute for Water Bag

Nearly everyone knows the value of a water bag for supplying a cooling drink when ice is not available. If none is at hand, a good substitute can be had by wrapping wet towels around a pail of water suspended in a breeze. The edges of the towels should overlap the rim of the pail and dip in the water. The cloth acts as a wick and draws up sufficient water to keep the towels moistened. The evaporation of the water in the towels cools the contents of the pail. It is well to cover the pail with a piece of cardboard, and if no breeze is blowing, to swing the pail on a rope tied to the limb of a tree.—Dick Cole, Los Angeles, Calif.

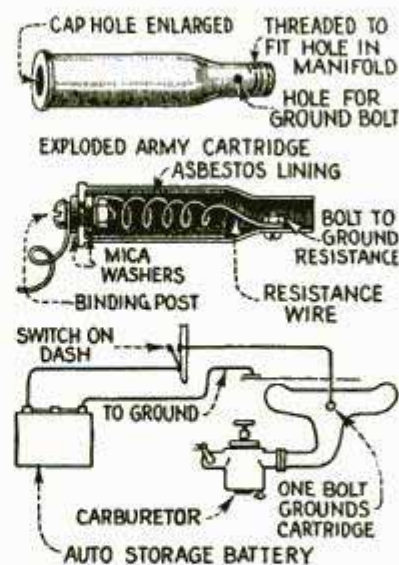
### Screw-Slotting Hacksaw Blades

Every mechanic's tool kit should contain a set of four screw-slotting hacksaw blades. These are similar to the ordinary blade, but are wider, and each of a set of four is of different width, the widest being  $\frac{1}{8}$  in. It is obvious that the set will save the metal worker considerable time in cutting slots and grooves. Slots wider than  $\frac{1}{8}$  in. can be made by making

the second cut parallel to the first. Little or no dressing up is necessary when the job is finished.—J. S. Hagans, Chicago, Ill.

### Homemade Gas Vaporizer for the Auto

Here is a gas vaporizer that will help to start your car quickly on a cold day. It consists of an army-rifle cartridge shell threaded at the small end to fit a tapped hole in the gas-intake manifold. The cap hole is enlarged so that a screw slipped through two mica washers, one on the inside and the other on the outside of the cap, will not touch the shell. A hole is drilled through the side of the shell at the small end for another screw, but this one, unlike the first, must make actual contact with the shell. A piece of asbestos paper is cut so that, when rolled to form a cylinder, it will fit snugly inside the large part of the shell. Get a length of resistance wire, as part of the element from a discarded electric-heating unit, wrap it around a nail to form a small coil and connect it to the two screws on the shell, as indicated in the illustration. Screw the shell into the hole you drilled in the intake manifold. Connect the screw on the cap of the shell to one side of a switch, which may be mounted on the dash or instrument board, and connect the other side of the switch to the ungrounded side



of your storage battery. By closing the switch so that current will flow through the resistance wire in the shell, considerable heat will be produced almost instantaneously, and this will enter the intake manifold, vaporizing

the gas before it reaches the cylinders.—Clyde E. Volkers, Terre Haute, Ind.

☞ A mixture of four parts sodium fluoride and one part of pulverized sugar is effective in destroying ants.



# SHOP NOTES



All Shop Notes published in 1928, in book form—Fifty Cents—from our Book Department

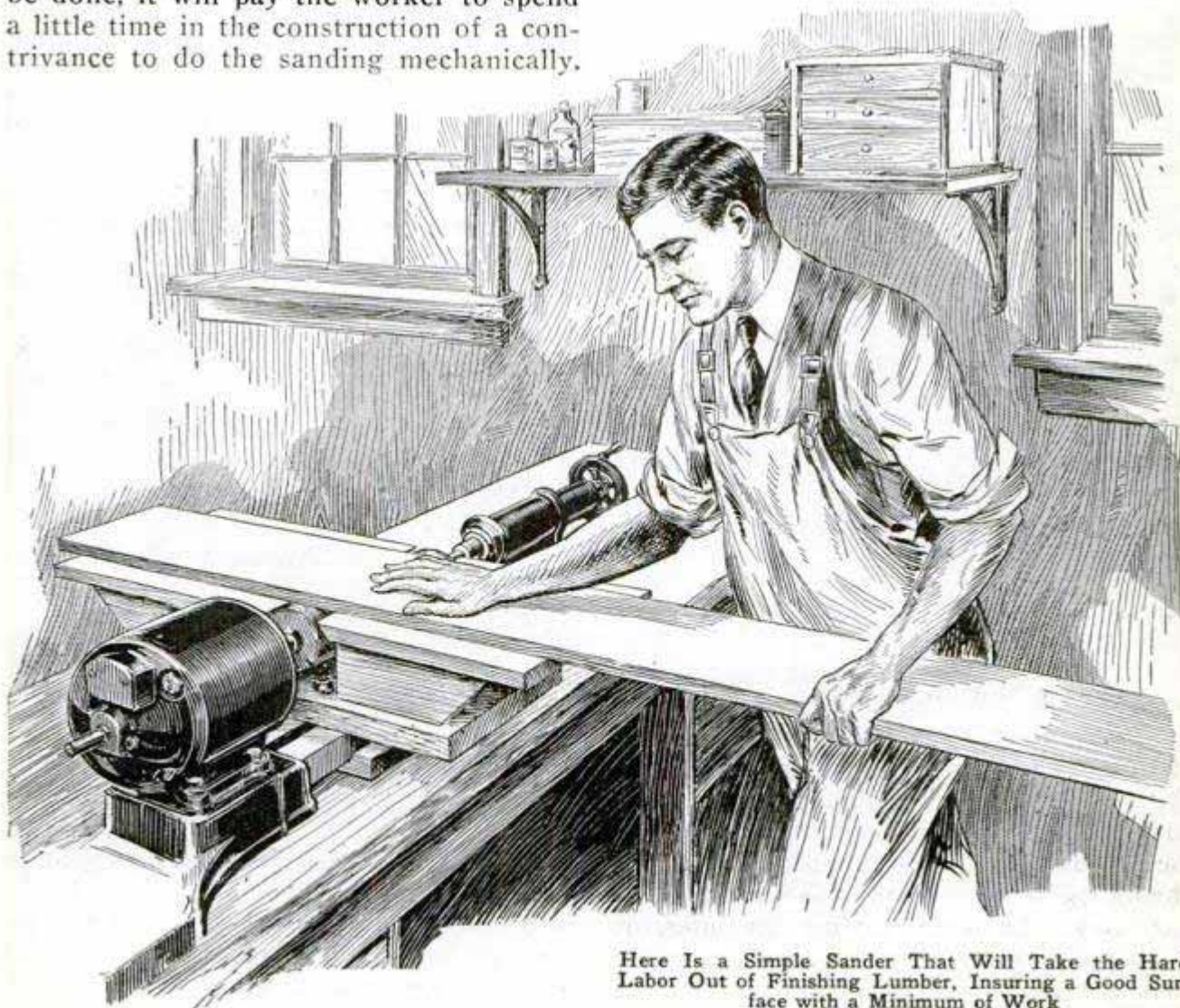
## Sanding on the Lathe

By W. CLYDE LAMMEY

**M**OST home craftsmen will agree that the sanding of their work, preparatory to finishing, is the most tedious part of the whole business, and, for that reason, it is often slighted, to the detriment of the finished job. Sanding rough stock especially demands the use of no little energy, and where there is much of this work to be done, it will pay the worker to spend a little time in the construction of a contrivance to do the sanding mechanically.

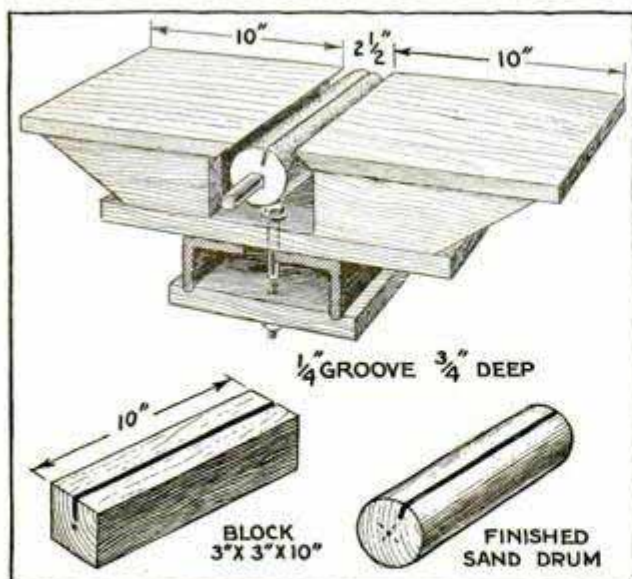
This is easy if he has a small lathe in his home shop.

Obtain a piece of 3 by 3-in. stock, 10 in. long, and cut a groove,  $\frac{1}{4}$  in. wide and 1 in. deep, down the center of one face, that is,  $1\frac{1}{2}$  in. from the edge. Center the piece in the lathe and turn it to form a drum,  $2\frac{3}{4}$  in. in diameter. Be careful to



Here Is a Simple Sander That Will Take the Hard Labor Out of Finishing Lumber, Insuring a Good Surface with a Minimum of Work





have the drum of exactly the same diameter throughout its length. Any kind of stock will do for the drum, although good well-seasoned hardwood is preferable.

Next get a piece of 2 by 8-in. stock and cut from it a piece, 16 in. long. Draw a line square across the stock, in the center of its length, and on this line bore two holes for  $\frac{1}{4}$ -in. bolts. Cut another piece of stock of the same width, but 1 in. thick and about 2 in. longer than the width across the lathe ways. Cut two grooves across the face of this piece, so that they will fit over the underside of the lathe ways, as shown in the drawings, and, using the first piece as a template, drill two holes for  $\frac{1}{4}$ -in. bolts.

The height of the table shown in the illustrations is  $5\frac{7}{8}$  in., from the top of the lathe bed to the top of the table. This is for a lathe of 8-in. swing, but of course this dimension must be determined by the lathe the sander is to fit. The tables are made of 1-in. stock, well dried, and should be at least 8 in. wide, and better 10 in., to afford a good bearing for the work. They must be planed to a true surface and mounted rigidly on the 2-in. base. Use screws and glue (not nails) in assembling, and be sure that the height of the drum carrying the sandpaper will not be more than  $\frac{1}{16}$  in. above the surface of the tables. Also be sure that the surfaces of the tables are not thrown out of true in assembling. Bevel the ends of the tables that go next to the drum. The method of mounting the assembly on the lathe is apparent from the drawings.

A sheet of garnet paper is attached to

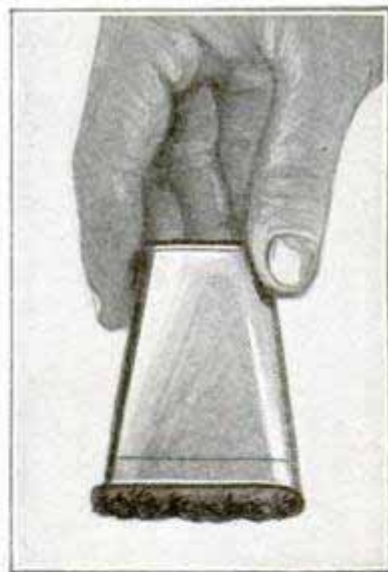
the drum by cutting to size and folding the edges into the groove, afterward driving short wedges into the groove on the ends and cutting them off flush with the surface of the drum, so that they do not strike the work.

It will be found that this sander is a great improvement over the hand method, the high speed of the lathe leaving the work smooth and without objectionable scratches. It also leaves a true surface, if the work of constructing the sander has been done with reasonable care.

### Swab for Applying Acids

An easily made swab for applying acids and other substances, which must not come in contact with the fingers, is shown in the photo. Simply remove the contents from an old flashlight dry cell, fold a piece of burlap or heavy cloth into a flat strip and pinch the opening of the cell tightly over it.

The zinc is worked easily with the fingers, and it holds the cloth or swab firmly. The remainder of the cell provides a convenient grip for the swab.—F. W. Bentley, Jr., Missouri Valley, Iowa.



### Parts of Car That Are Seldom Lubricated

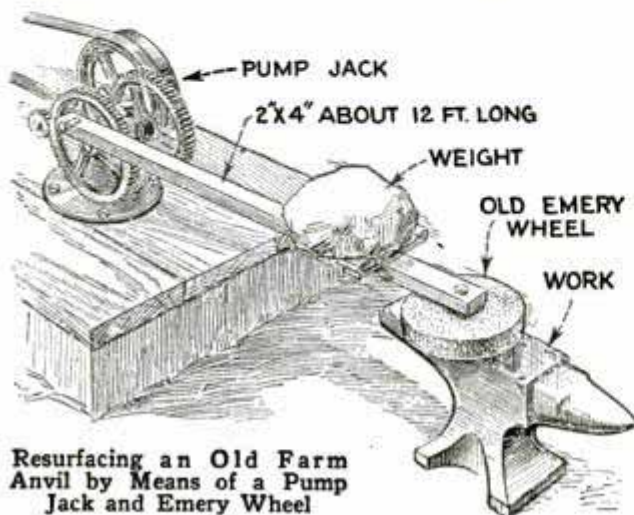
Many automobile owners are under the impression that every part of the car has been oiled or greased sufficiently at some time or other. However, this is far from true, and there are usually a number of places that are seldom lubricated even though they need it badly. Insufficient lubrication often is the cause of expensive repairs. The grease cups that are hard to get at are neglected even by many garage attendants, so the owner ought to know where they are. They are usually found in inconspicuous locations as, for exam-



ple, the two cups that oil the outer rear-axle shaft and the roller bearings. These are located on the rear-axle housing, near each end and close to the brakes. It is more important that they be given attention than the spring hangers, but in spite of this, only a few auto owners know of their existence. These cups should be filled once a month. The efficiency of the brakes depends to some extent on how well the brake mechanism is lubricated. One brake pin may "freeze" for lack of oil, and this will throw the entire mechanism out of proper adjustment. Once a month it should be oiled, from the pedal to the brake shoes, with penetrating oil. Another often neglected part is the universal joint. Of course, nearly everyone knows it's there but it is nevertheless frequently overlooked. A few drops of oil on the generator is necessary now and then and clutch bearings should not be forgotten.

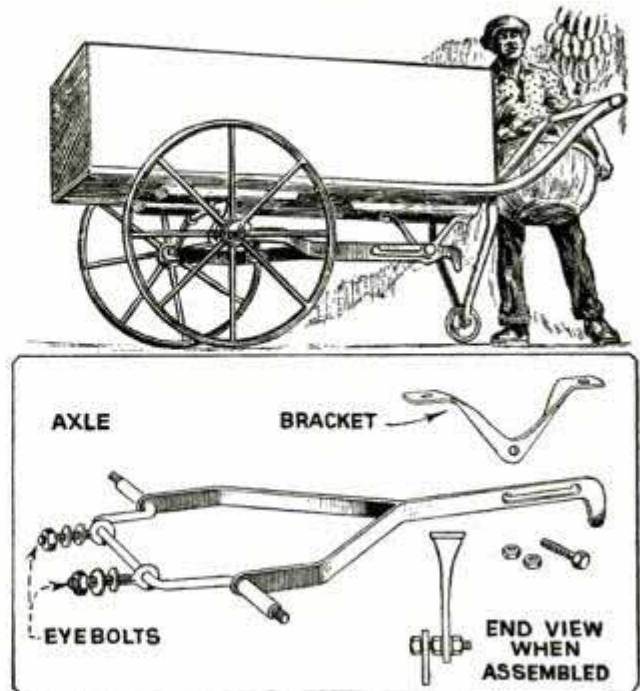
### Resurfacing Farm Anvil

An old farm anvil can be resurfaced with very little work by using the rig shown in the illustration, which consists of a grindstone or emery wheel driven back and forth over the anvil surface by means of a pump jack run by a small engine. A 12-ft. length of 2 by 4-in. stock is used as a connecting rod between the pump jack and the emery wheel, and a suitable weight is tied or otherwise fastened to the top of the connecting rod, near the emery wheel, as indicated. In some cases, it may be found necessary to provide guides for the connecting rod so that the emery wheel will not slip off.



Resurfacing an Old Farm Anvil by Means of a Pump Jack and Emery Wheel

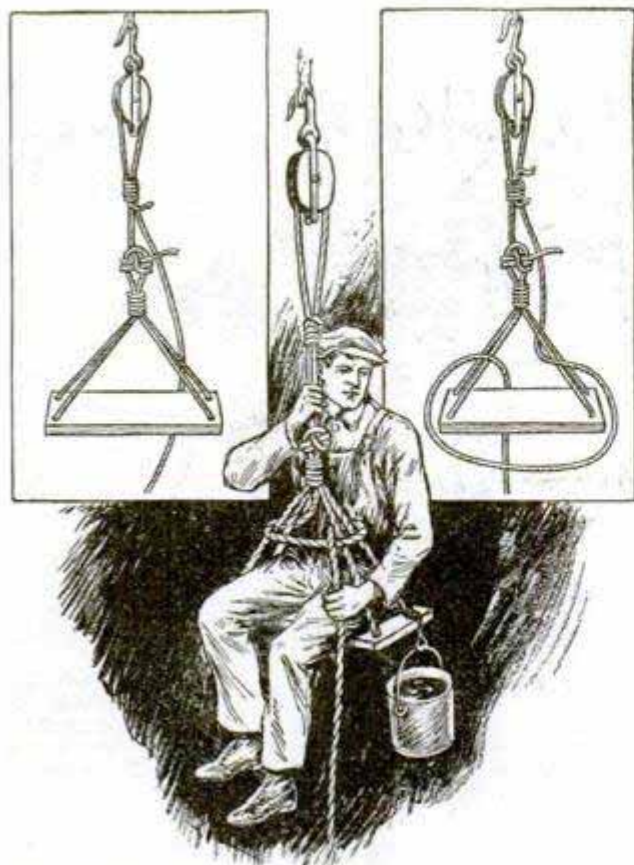
### Load-Balancing Pushcart



Heavily Loaded Cart Can Be Better Balanced by Shifting the Axle

Loaded pushcarts are often improperly balanced so that, when the greatest weight is on the front end, the cart will have a tendency to tip over in this direction, and when the most weight is on the back, the person pushing the cart must practically lift the load besides pushing it, which is very tiresome. To overcome this trouble, I arranged the axle so that it could be moved either forward or backward to balance the load. The axle was bent to a U-shape and was securely attached to the underside of the cart by means of eyebolts. A Y-shaped brace, made from flat iron, was fitted on the ends of the axle, holes being drilled in the ends of the brace for this purpose. A slot with two notches was cut in the single end of the brace to accommodate a bolt, with which it was held to a flat-iron bracket attached to the underside of the cart near the handle. The bolt is fastened securely to the bracket by means of two nuts, and the slot in the Y-brace slips on the shank of the bolt, but cannot come off as it is held between the head of the bolt and one of the nuts. The end of the Y-brace is bent down at right angles to form a handle, permitting the worker to shift the brace and wheels back and forth as desired. The body of the cart is held quite firmly in either position.—S. E. Schofield, Indianapolis, Ind.





Simple Hitch Permits Worker to Lower Himself at Will on Boatswain's Chair

### Rigging Boatswain's Chair

To rig a chair for lowering or raising yourself, hook a single block on the roof, wall or structure on which you are going to work, and with a gantline rove through it, make the chair fast as shown in the upper left-hand detail. Get in the chair and have someone pull you up to the top. Then take a small length of rope or strong marline and lash the two parts together, being careful to have the lashing secure so that it will not slip. The man below can then let go of the end so that you can pull up some slack. Then take hold of the bight of the rope and pull it toward you through the bridle of the chair as in the upper right-hand detail. Slip the bight over your head, around your body and the chair, and draw it up as shown in the center drawing. You can now let go of the lashing and you are all set to lower yourself at will. This is done by taking hold of the rope and pushing it through the loop. It cannot slip or get away from you.—C. Newkirk, Chicago, Ill.

☞ A length of garden hose, split and slipped over the teeth of a saw that is being filed, is a handy arm protection.

### Reducing Speed of Lathe

Here is a novel method of reducing the speed of a small metal-cutting lathe: Get an old-type auto-starting motor equipped with a sprocket, of the kind used on many models prior to 1919. These motors have a reduction gear, which in case of a Wagner motor is 1 to 10. Remove the core and commutator from the shaft so that the case serves merely as a housing for the shaft and the gears. A small grooved pulley, suitable for a  $\frac{1}{4}$ -in. round belt, is securely fastened to the shaft. A length of belting is run from this pulley to a similar grooved pulley on the motor that drives the lathe. A bicycle sprocket is attached to the driving pulley on the lathe and in line with the sprocket on the starting motor, the two being connected with a bicycle driving chain. I have reduced the speed from 1,750 to 50 r.p.m. in this way.—Sidney Cornell, New York City.

### Compressing Heavy Springs

When assembling rather stout or heavy springs, as, for example, the spring retainers for truck radiators, the method illustrated will prove advantageous. A wire nail is placed through the cotter-pin hole in the end of the stud and the spring is screwed down on this, thus gradually compressing the spring. When the spring has been screwed down far enough, the washer and nut are slipped on a few threads, and the nail withdrawn. This method will save 10 to 15 minutes of fumbling and prying down on the spring, while trying to engage the thread of the nut.



### Annealing Small Sheets of Aluminum

After a small sheet of aluminum has become hardened by hammering or swaging, it can be softened again by smearing a thin coating of ordinary vaseline on both



sides and holding the sheet over a Bunsen-burner or gas-plate flame. The surface becomes black at first. By continuing the heating while moving the sheet back and forth, it will suddenly turn to its natural color. When this happens, the sheet must be removed immediately and left to cool in the air. Do not cool it under water. —L. L. Llewellyn, Piedmont, Calif.

### Adjustable Horses Found Convenient

A number of adjustable horses of the kind shown in the photo are used in a Denver machine shop for supporting broad material at the different machines. The horses are made mostly of wood. They are 4 ft. long and 30 in. high at the lowest adjustment. The 6 by 6-in. main part of the horse is braced to the legs with strap iron and reinforced with a  $\frac{1}{4}$ -in. steel plate on top and bottom. A 2-in. square bar of steel, with  $\frac{3}{4}$ -in. holes  $\frac{1}{2}$  in. apart, passes perpendicularly through the body, near each end. The top ends of the bars are split and forged to fit grooves turned in a 2-in. steel roller, which supports the material. A rod, passed through the holes in the vertical bars, holds the roller at any desired height.



Horse with Roller of Adjustable Height Found Useful in Machine Shop



Two Views of a Large-Size Photograph Printer Which Is Equipped with Exhaust Fan, Vacuum Pump and a Number of Switches

### Large-Size Electric Printer for the Photographer

Ordinary photographic printers will only take negatives up to 11 by 14 in. in size. To make prints 20 by 24 in., and larger, one firm found it necessary to build a special printer. The photo clearly shows the construction and the arrangement of the lamps and snap switches, one switch being used for every three lamps, to enable accurate control of illumination. Altogether there are sixty-three 60-watt lamps and two red lamps for placing the paper in position. This printer will take negatives up to 30 by 40 in. in size. After the negative is placed in position and the printing paper laid on it, the rubber blanket is clamped in place and, by starting the vacuum pump, with which this printer is equipped, all the air between the pressure glass, negative and paper is removed, insuring absolute contact over the entire surface of the print. Another feature is an exhaust fan on the left side to remove the hot air from the inside.

*Frank H. Wilding*



# Wood Joints for the Amateur

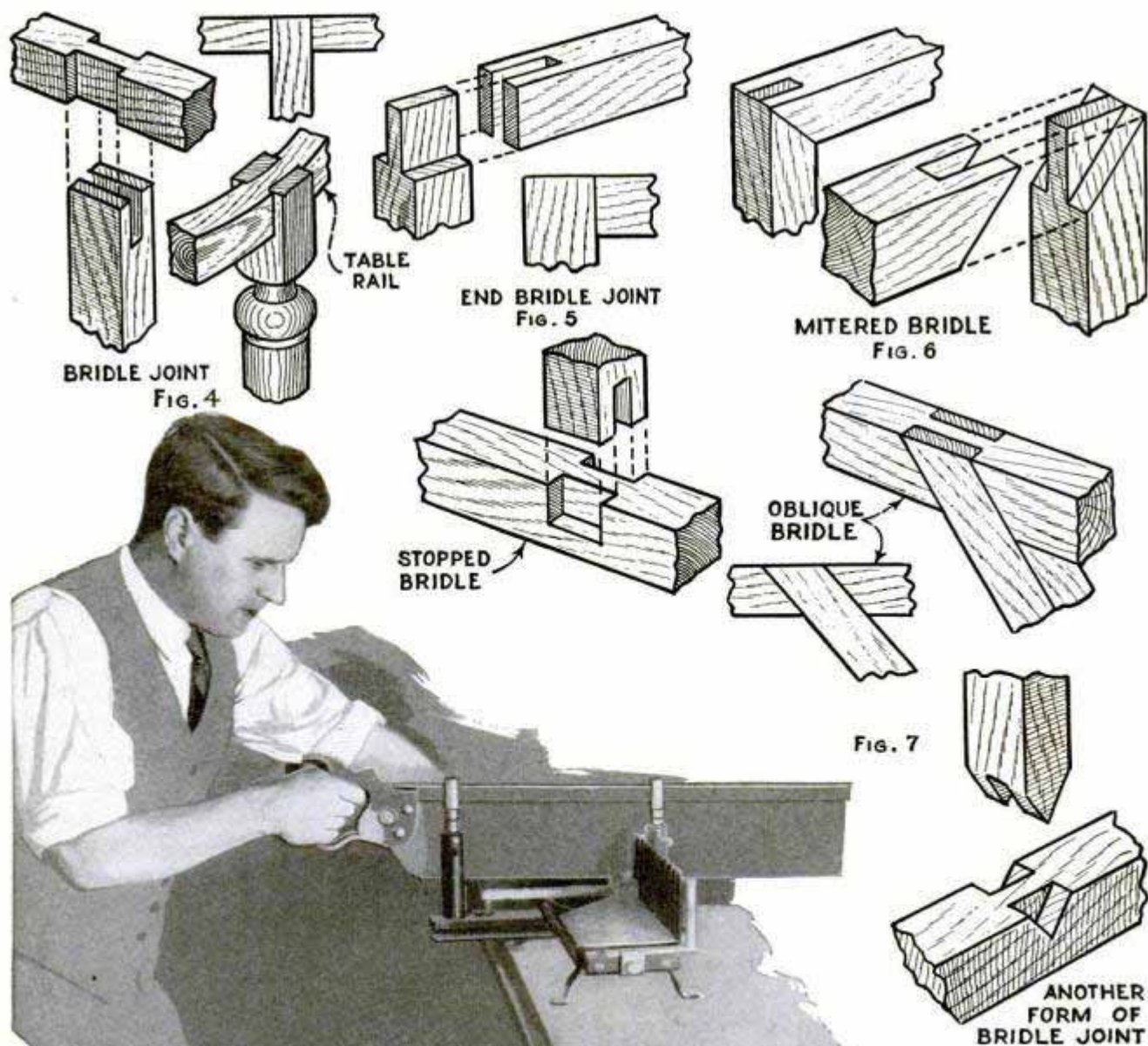
## PART III

**T**HE BRIDLE joint (Fig. 4) is a very handy joint for the amateur, since it is a little less difficult to make than the mortise-and-tenon joint. Its usefulness is not as wide as that of the latter and lies more in carpentry and joinery than in cabinetmaking. However, for light frames for small doors, window and draft screens, etc., it is quite satisfactory, and also for the center legs of small semi-circular tables, as indicated.

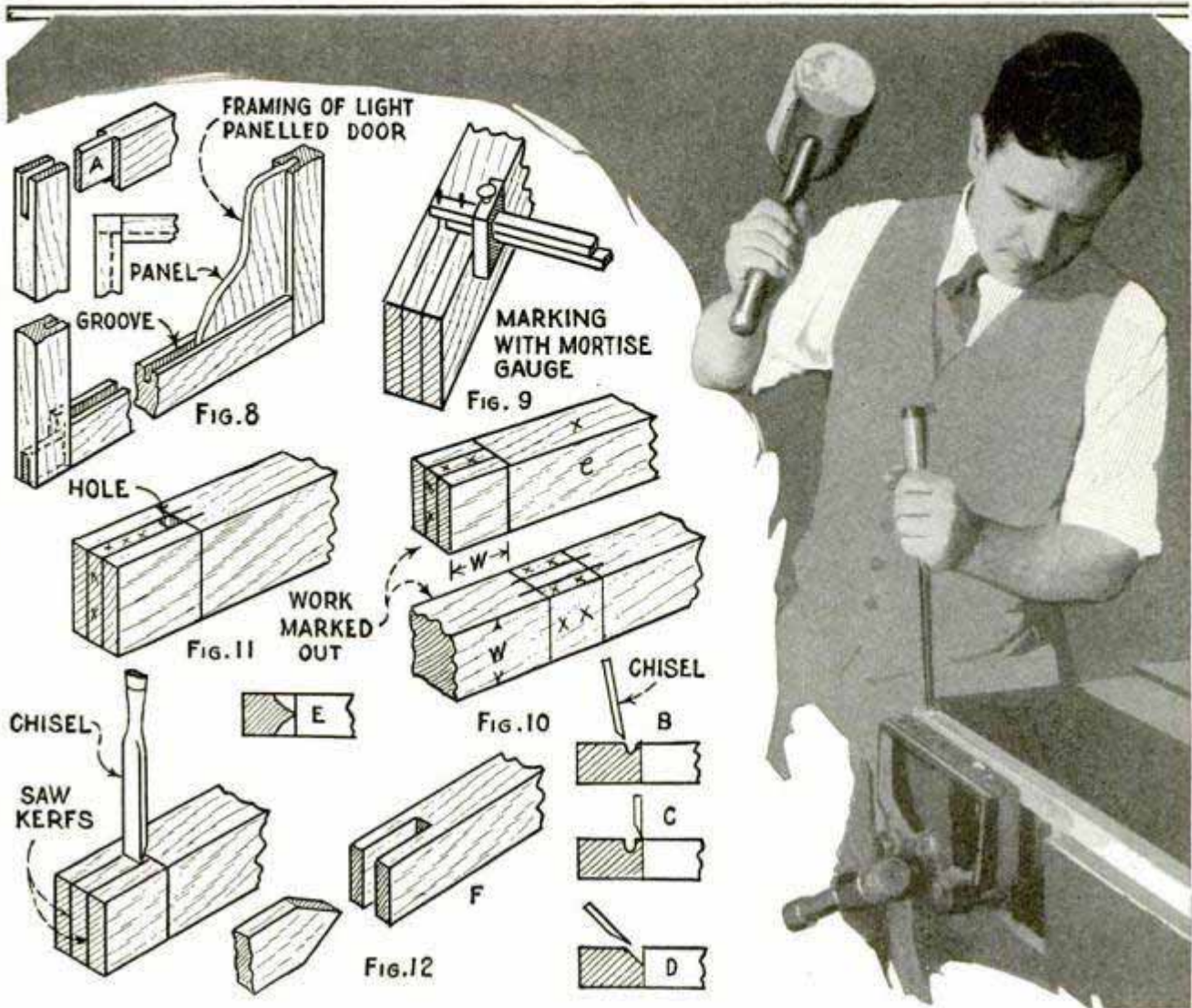
The end bridle joint of Fig. 5 is common for frames, and is known also as an open-slot mortise and tenon. The mitered bridle (Fig. 6) looks a little more difficult, but is really simple to make. The parts must be carefully laid out with square,

bevel gauge and knife. Then the vertical cuts forming the tongue are made, holding the work at an angle in the vise and cutting down to the line defining the length of the tongue. The shoulders are then cut in the miter box. The cutting of the mouth will be described later, in connection with the end bridle. The joints in Fig. 7 are used mostly in heavier work, although the oblique bridle finds occasional employ in cabinetmaking.

When making up a frame for a light paneled door, as in Fig. 8, note that the bottom of the groove for the panel on the inside edges of the rails is even with the inner edge of the tenon A, thus making the groove easy to plow. The grooves







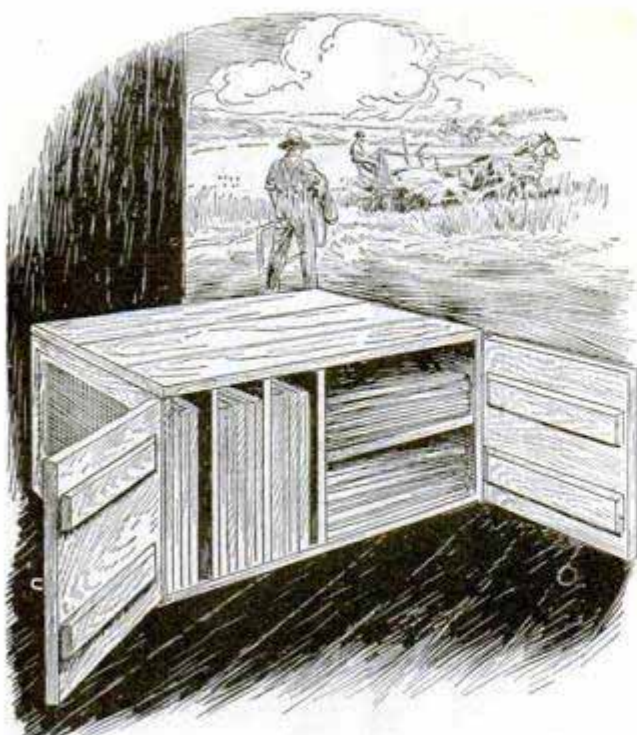
on the inside of the stiles run into the slots at the ends, so there is no difficulty in plowing them.

When making a bridge joint, the thickness of the stock is usually laid out into thirds. Set a mortise gauge to the size, and gauge the edges and ends as in Fig. 9, which shows how both pieces are laid out for an end bridge, or how the leg in Fig. 4 is marked out. Fig. 10 shows the two pieces laid out, and it will be seen that the length of the slot in the leg, W, is the same as the width of the rail. After laying out, mark the waste, or stock to be cut away. The waste on the rail is cut away exactly as described for making a half-lap joint (Fig. 2, March issue).

To cut out the waste in the slot, drill a hole, about  $\frac{1}{16}$  in. less in diameter than the width of the slot, as shown in Fig. 11, taking care to keep the hole vertical and square with the face edge; saw along the lines to release the waste, and pare the bottom of the slot square.

An alternative method is to make the kerfs first, sawing just inside the line, and down to the line for the bottom of the slot. Then, using a chisel the exact width the slot is to be and setting it, with the bevel toward the bottom of the slot, about  $\frac{3}{16}$  in. away from the line (see left-hand sketch, Fig. 12), drive the chisel in about  $\frac{1}{2}$  in.; withdraw and move it back about  $\frac{1}{2}$  in., with the bevel facing outward and drive it in as at B, so as to take out a triangular chip. Set the edge of the chisel exactly on the line for the bottom of the slot, with the bevel toward the outer end, and drive it straight down, as at C. Move the chisel outward again, and take another chip as at D. This will bring the cut down to about the center of the stock. Now turn the stock over and repeat the process on the other side, so that the stock will appear as in the section at E, and the waste will drop out as at F. If the cutting has been carefully done, no further work is necessary.





Box with Shelves and Partitions, Locked Door and Air Holes, Protects Grain Bags

### Box for Fanning-Mill Screens and Grain Bags

Fanning-mill screens and grain bags can be kept out of the reach of rats and mice by storing them in a wooden box, as shown in the illustration. Shelves and partitions are provided in the box so that the stored material can be arranged in an orderly manner, and large holes are cut in the ends to provide adequate ventilation, the holes being covered with wire mesh tacked down securely on the inside to prevent the entrance of rodents. Care should be taken to have the door or cover fit snugly and a hasp and padlock may be provided. Periodical examination of the box is recommended so that, if rodents have gnawed a hole in it, prompt repair can be made.—J. R. Koontz, Bremen, Ind.

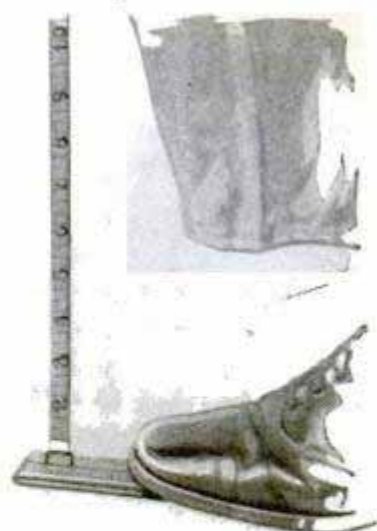
### Prints from Wet Negatives

Nearly every photographer realizes that certain pictures, especially those for newspaper publication, must be finished quickly in order not to lose their news value. To make contact prints from wet negatives, a saturated solution of potassium carbonate is prepared. After the negatives have been washed they should be wiped off carefully with a soft cloth or a piece of chamois skin, and placed in the potassium-carbonate bath for a few mo-

ments, after which they are again wiped dry. The potassium carbonate provides a dry surface from which contact prints can be made. The negative should be thoroughly washed and dried in the usual way after the prints have been made. When enlargements from wet negatives are required, the negative should be rinsed free from hypo and placed in a five-per-cent solution of formaldehyde for one or two minutes. The negative will then withstand the heat of the enlarger and any number of copies can be made. If the negative is to be preserved, it must be washed and dried in the regular way after being removed from the enlarger.—Jesse A. Leason, St. Paul, Minn.

### Kink for Using Tape Line

Often, when using a tape line, one has no helper around to hold the eye end, which is particularly inconvenient when measuring from one point to another without any surface to press the line against. This trouble can be eliminated in many cases by opening the middle section of a 2-ft. rule, catching the eye of the line on the small wire pin, and then closing the halves of the rule so that the eye will be held firmly between them. When making vertical measurements the rule can be laid down and one foot put on it while drawing the tape taut. If the measuring is to be done on the ground, the rule can be pushed down into the soil.



### Preventing Marks on Work in Lathe

When running a piece of finished work in a lathe steady rest, it is common practice to place a piece of soft metal over the end of the jaws in order to prevent them from scratching the work. A better and more up-to-date method is to make an



extra set of jaws out of bakelite or similar material. They are very strong and will not scratch the work.

### Clearance of Milling Cutters

In grinding the clearance on the cutting edge of milling cutters, sufficient attention is usually not paid to the angle or exact amount of clearance the cutter will have on the work. If too great, the cutter will have a tendency to chatter and make a rough finish, to say nothing of the disagreeable noise, and the loosening up of the bolts and clamps on the machine will cause the heel of the land to drag, making an uneven surface, and is liable to break the teeth. The angle depends, to a great extent, on the diameter of the cutter and also on the material it is to cut, although, in general, milling cutters are used on almost anything that can be cut, from a piece of hard wood to high-carbon tool-steel, making regular shapes, such as plain, slabbing, slanting, or angular, while in those that are made up for a special job and used for that purpose only, more attention must be given to the kind of material to be cut. Generally soft materials will machine better with more clearance than tool steels, and the like, although conditions may cause the reverse to happen. Usually, for cutters up to 4 in. in diameter, from 6 to 7 deg. will be found ample on the outside diameter. Over and above this diameter, the angle may decrease, say,  $\frac{1}{4}$  deg. for each 1 in. in diameter, until 4 deg. is reached, which is about the minimum amount for any cutter. The clearance on the teeth of end mills should be from 2 to 3 deg., when the cutters are used for roughing and finishing. If used for roughing alone, a little more clearance will be better. —A. Dane, Pottstown, Pa.

### When Breaking Concrete

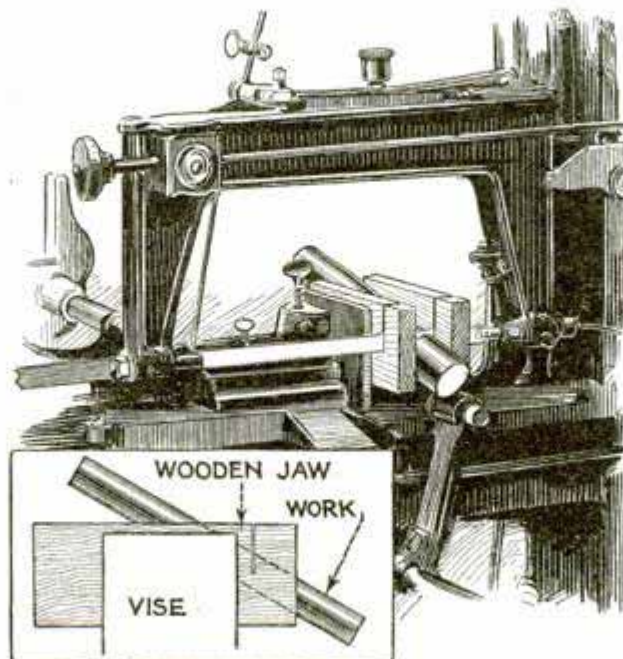


Using an Old Broom to Hold the Chisel When Breaking Concrete

An old broom will come in handy when breaking up concrete. Use it as shown in the drawing to hold the bull point or chisel, and to prevent bits of concrete from flying up. When using a compressed-air hammer, or power concrete breaker, slip a piece of screen, about 1 ft. square, over the point of the drill. This will enable the operator to see the work through the screen without danger from flying bits of concrete.

### Sawing Metal Rod at an Angle.

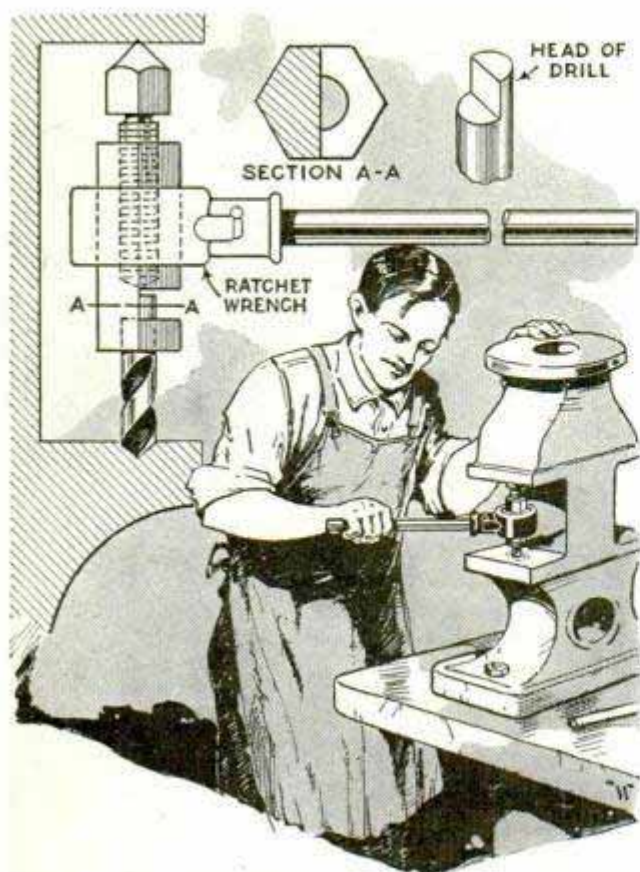
To saw lengths of tubing or metal rod at an angle on the power saw, I use a couple of pieces of wood as auxiliary vise jaws.



Using Wood Jaws for Sawing Metal Rod and Tubing at an Angle

By allowing these to extend a little beyond the cut as indicated, I have found the work can be sawed at any angle just as easily as straight. The saw, of course, cuts through the wood jaws before striking the work, so that, by the time it reaches the cut, it is well guided. Scrap pieces of wood are usually to be found around any machine shop. —Harry Moore, Montreal, Can.





Tool Driven by a Ratchet Wrench, Handy for Drilling in Confined Places

### Simple Tool for Close Drilling

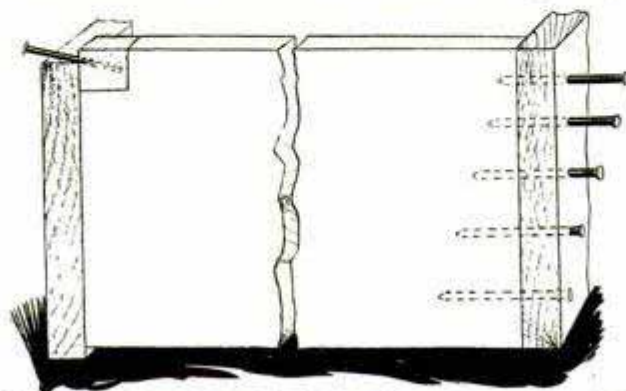
For drilling in close places, a small ratchet drill is often found too large. A more compact tool is necessary where the flanges of the castings or the webs of channels are spaced 3 or 4 in. apart. One of the handiest devices for use on such jobs consists of a suitable length of hexagon bar stock, a setscrew and a ratchet wrench. A hole is drilled in one end of the bar to accommodate the drill, and the other end is drilled and tapped for a setscrew, the head of which is ground to a point. The drill is ground down, half of the head being removed as shown in the upper-right detail. This allows it to be securely locked so that it will not turn. The ratchet wrench is then slipped over the body of the tool, and by manipulating this, the hexagon part will be turned and the screw will be fed down into the work.—G. A. Luers, Washington, D. C.

### Strong, Durable Plaster-of-Paris Mixtures

Fifteen years ago, I set  $\frac{1}{4}$ -in. bolts, attached to a sundial triangle, into  $\frac{5}{8}$ -in. holes, 3 in. deep, in a stone base on the grounds of the Ontario hospital, at West Toronto, Can. The cement I used was made of 4 oz. of plaster of paris, 4 oz. of portland cement, and  $\frac{1}{2}$  oz. of dark brown sugar. The ingredients were well mixed, and just enough water was added to make the whole fairly stiff. This cement has been exposed to the weather at all times, and the bolts are as firmly set in it as they were 15 years ago. The same mixture is often used by heating engineers to cement together the joints on 4-in. cast-iron pipe, sometimes used in greenhouse heating. It sets very hard and is waterproof and easy to work. The addition of a small quantity of fine sand will make a stronger and perhaps harder cement. To keep plaster of paris soft for slow working, mix wheat flour in it, in the proportion of  $\frac{1}{4}$  oz. of flour to every 5 oz. of plaster. Using a greater amount of flour will retard the drying of the cement still more. If asbestos powder is used in plaster of paris to make it tough, it should be very carefully sifted through an extra-fine sifter before using it. Coarse asbestos powder will prevent the cement from setting so strongly as when finer powder is used. All combinations of plaster of paris and other powders should be thoroughly mixed before adding any liquid.—James E. Noble, Toronto, Can.

### Nailing Joists Single-Handed

One man can handle a joist single-handed and nail it in place at both ends by the method shown in the illustration. Drive a nail partly in at one end near the



Joists Can Be Nailed in Place Single-Handed by Following This Method

top of the joist and hook the nail over the sill to hold the joist in place temporarily until the other end has been nailed securely. Then remove the first nail and proceed to nail this end also.—H. H. Siegle, Emporia, Kansas.

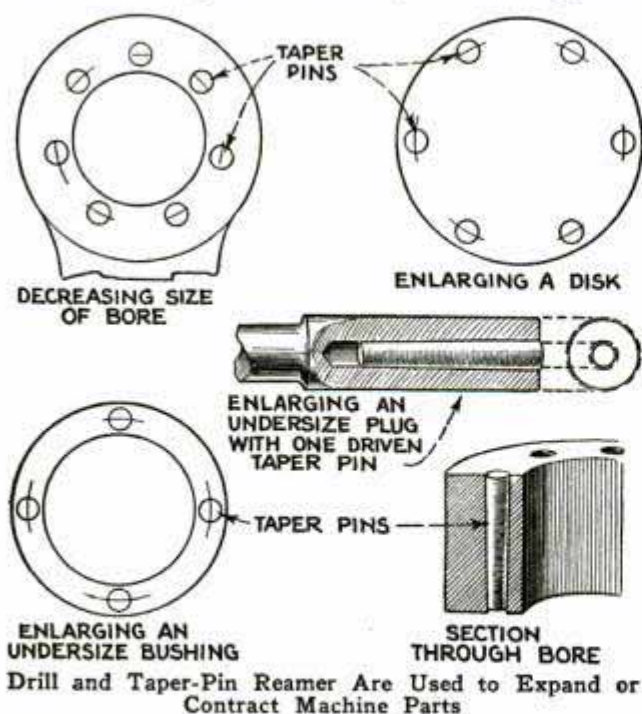


### Kink for the Planer Bed

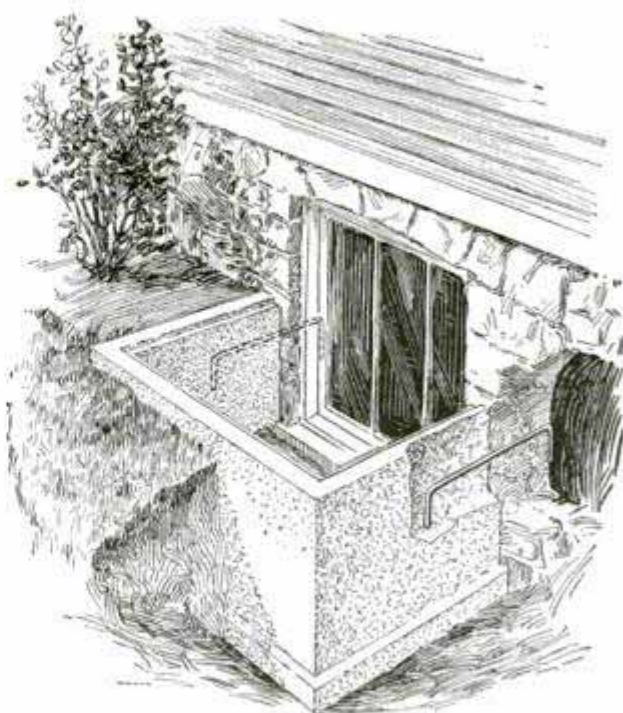
While watching a worker setting up a job on the planer bed one day, I noticed that he had his clamps resting on several sloping surfaces. Wondering how he was able to keep the clamps from slipping off, I investigated and found that he had placed short pieces of old files between the end of the clamp and the metal incline, making the surface non-slipping.—Frank N. Coakley, Buffalo, N. Y.

### Expanding and Contracting Circular Machine Parts

Circular machine parts are sometimes machined slightly over or undersize. In the latter case, the part is sometimes plated to restore it to the desired diameter, but, in many small shops not having plating equipment, simpler expedients must be used. A method of expanding and contracting circular parts, which, while not highly accurate, will serve in many cases, consists in driving a taper pin into reamed holes drilled near the edge of the work as shown in the drawing. The examples illustrate the method of decreasing the size of the bore and enlarging an undersize bushing, plug or disk. The material to be altered must be moderately soft, so that it will yield to the pressure applied



with a comparatively hard taper pin. The only tools necessary for this work are the usual drill and taper-pin reamer.



Iron Hooks Used to Anchor Concrete Window Box Securely to Basement Wall

### Window Boxes Anchored to Cellar Wall

Many houses built nowadays have the first floor only a short distance above the ground level, which makes it necessary to box in the basement windows. The boxes are usually made of concrete and, in many cases, they gradually pull away from the wall and allow leakage. To prevent this, one contractor anchored them securely to the wall by means of two iron hooks, as indicated in the drawing, the hooks being imbedded in the concrete when this is poured. If the basement wall is built of stone or concrete blocks, the anchors are slipped between the stones or blocks when the latter are laid, and then imbedded in the window box. It has been found practically impossible for the boxes to pull away from the wall when anchored in this way.

### Easy Method of Sandpapering Auto

When I started the job of repainting my auto, I knew that a lot of sandpaper and muscle was necessary. I drove the car down to the beach, and by using plenty of sand and water with a piece of heavy felt, I removed most of the paint. By using a fine grade of sandpaper in going over it a second time for finishing touches, the job came out very smooth, at a considerable saving in effort and sandpaper.—Charles Latour, Jr., Plattsburg, N. Y.





## PART II

**F**IGURES 5 and 6 detail the upper section. While complicated in the assembly, the individual parts are comparatively simple. The back is 2 ft.  $2\frac{3}{4}$  in. by 3 ft.  $4\frac{3}{4}$  in. From the right upper corner a piece,  $7\frac{3}{4}$  by  $11\frac{3}{4}$  in., is cut, and for a distance of 5 in. above the horizontal part a strip  $\frac{1}{4}$  in. wide is cut. Mark for this cut and saw obliquely toward it, springing the blade out, and cutting in with the line as quickly as possible. Then saw in the opposite direction to finish the cut. This notch receives the rabbeted end of a side-piece. The upper left corner is cut out 8 in. by 1 ft. 10 in., the vertical cut then be-

ing notched  $\frac{1}{4}$  by  $6\frac{1}{4}$  in. at the bottom and  $\frac{1}{4}$  by  $7\frac{1}{2}$  in. at the top. Rabbet the lower end  $\frac{1}{4}$  by  $\frac{3}{4}$  in. for  $8\frac{1}{4}$  in. from the left, and 8 in. from the right.

The long right side (center piece marked A in Fig. 6) is  $16\frac{3}{4}$  in. by 34 in. Rip  $\frac{3}{4}$  in. off the back, extending from the lower end to within  $4\frac{3}{4}$  in. of the top. Cut a  $7\frac{3}{4}$  by 8-in. piece from the lower back corner, and rabbet it  $\frac{1}{4}$  by  $\frac{3}{4}$  in. Then, from the front upper corner, take a piece  $7\frac{1}{4}$  by 9 in. A  $\frac{1}{4}$  by  $\frac{3}{4}$ -in. dado is cut full width of the inner face,  $12\frac{1}{4}$  in. from the lower end, and a second one,  $2\frac{3}{4}$  in. above it. A third is made 7 in. farther up, that is, with the upper side flush with the bottom of the big

notch. This is deepened to  $\frac{1}{2}$  in. on the horizontal part of the notch, and this  $\frac{1}{2}$  by  $\frac{3}{4}$ -in. rabbet is carried up the notch and across the top. The left rabbet corner is notched  $\frac{3}{4}$  by  $\frac{3}{4}$  in. A vertical dado, running from the lower end to the first dado, is  $7\frac{1}{4}$  in. from the front edge. Rabbet the projecting lower end  $\frac{1}{4}$  by  $\frac{3}{4}$  in. On the outer face two dados,  $\frac{1}{4}$  by  $\frac{3}{4}$  by  $8\frac{3}{4}$  in., are cut, one 7 in. above the lower end, the other  $8\frac{3}{4}$  in. above the first. A third, full width of the narrow upper end, is  $10\frac{1}{2}$  in. above the second.

The long left side (left-hand piece A, Fig. 6) is 1 ft.  $4\frac{3}{4}$  in. by 3 ft. 5 in. The inner-face dados correspond to those of the other side, as does the lower rabbet



# Modern Bookcase

by

E.M. Love

3607 Louisiana St.  
San Diego  
Calif.

and notch. A fourth horizontal dado corresponds to the upper rabbet of the other side. The upper end is rabbeted  $\frac{1}{2}$  by  $\frac{3}{4}$  in. Between the two upper dados cut out a rectangle,  $8\frac{3}{4}$  in. wide, and rabbet all around this  $\frac{1}{2}$  by  $\frac{3}{4}$  in. Cut a  $\frac{3}{4}$ -in. strip off the back edge from the bottom to a point 1 ft.  $6\frac{1}{2}$  in. above, and rabbet the rest  $\frac{1}{2}$  by  $\frac{3}{4}$  in. A  $\frac{1}{4}$  by  $\frac{3}{4}$ -in. dado extends from the upper horizontal dado to the top rabbet, as in Fig. 6. Two dados,  $\frac{1}{4}$  by  $\frac{3}{4}$  by  $7\frac{1}{4}$  in., on the outside at the back, one  $7\frac{1}{2}$  in. above the lower end, the other  $9\frac{1}{4}$  in. above it, carry the small side shelves.

Make the top (A in Fig. 5)  $10\frac{3}{4}$  by  $16\frac{3}{4}$  in. Rabbet the back edge on the underside  $\frac{1}{2}$  by  $\frac{3}{4}$  in., and saw a strip off the right side,  $\frac{1}{4}$  in. wide, for a distance of 8 in. from the front. The shelf below (K) is  $10\frac{1}{2}$  in. by 1 ft.  $3\frac{3}{4}$  in., with a  $\frac{1}{4}$ -in. strip off the left side,  $7\frac{3}{4}$  in. long. The next shelf down is the same, except that a  $\frac{1}{4}$ -in. strip, 8 in. long, is removed from the right edge, starting from the back. The following two shelves are  $10\frac{1}{2}$  in. by 1 ft. 4 in. The bottom shelf is L-shaped,  $18\frac{1}{4}$  in. wide at the back, 1 ft. 4 in. from the front to the back, and 10 in. wide in front. It fits both the middle and the right compartments.

The three partitions are next made. The upper one, between the top and the first shelf down, is  $6\frac{1}{2}$  in. high and  $10\frac{3}{4}$  in.



wide. The middle one, just below it, is  $8\frac{1}{4}$  in. high and  $10\frac{3}{4}$  in. wide. The one below this is  $8\frac{1}{4}$  in. high and  $10\frac{1}{2}$  in. wide, while the lowest is  $12\frac{1}{2}$  by  $10\frac{1}{2}$  in.

At this stage it is well to assemble the parts so far as they are made, not only because it makes clearer the arrangement of the other pieces, but also because any small errors may be compensated for in making the rest. Assemble the sides with the shelves and partitions, nailing the butted upper and lower edges of the partitions, and add the back.

The top of the right wing, 8 by  $9\frac{1}{2}$  in., is rabbeted  $\frac{1}{2}$  by  $\frac{3}{4}$  in. on the underside



at the back. The front section fitting with it is  $7\frac{3}{4}$  by 12 in., rabbeted at the upper and lower edges. It makes a butt joint with the long side, while the top piece fits into a dado. The shelf below is  $7\frac{3}{4}$  by  $8\frac{1}{2}$  in., and the sidepiece fitting against it is  $9\frac{1}{2}$  by  $8\frac{3}{4}$  in., rabbeted  $\frac{1}{2}$  by  $\frac{3}{4}$  in. at the top and bottom. In addition, the front edge is notched back  $\frac{1}{4}$  in. to fit into the rabbets of the front pieces. The next shelf is also  $7\frac{3}{4}$  by  $8\frac{1}{2}$  in., and the lower front part is  $7\frac{3}{4}$  by  $8\frac{1}{2}$  in., rabbeted  $\frac{1}{2}$  by  $\frac{3}{4}$  in. at the top and  $\frac{1}{4}$  by  $\frac{3}{4}$  in. at the bottom.

The top of the left wing, detailed in Fig. 6, is  $8\frac{1}{4}$  by 8 in., and rabbeted  $\frac{1}{2}$  by  $\frac{3}{4}$  in. at the back. The middle shelf is

8 by  $7\frac{1}{4}$  in., and the lower is  $8\frac{1}{4}$  by  $7\frac{1}{4}$  in. The side is 8 by 19 in., with the upper end and back rabbeted  $\frac{1}{2}$  by  $\frac{3}{4}$  in., and the lower end  $\frac{1}{4}$  by  $\frac{3}{4}$  in. A  $\frac{1}{4}$  by  $\frac{3}{4}$ -in. dado across the inner face, 10 in. from the lower end, supports the middle shelf.

When assembled, plane off all projecting ends and scrape uneven inside places. A  $\frac{1}{4}$ -in. strip of wood is glued into the open joint inside the right lower compartment.

It is difficult to hide the plies of the edges with paint, even though they are well sandpapered. The writer has found gesso to be the most satisfactory preparation for filling the plies. Smear on thickly, working well into the pores, and

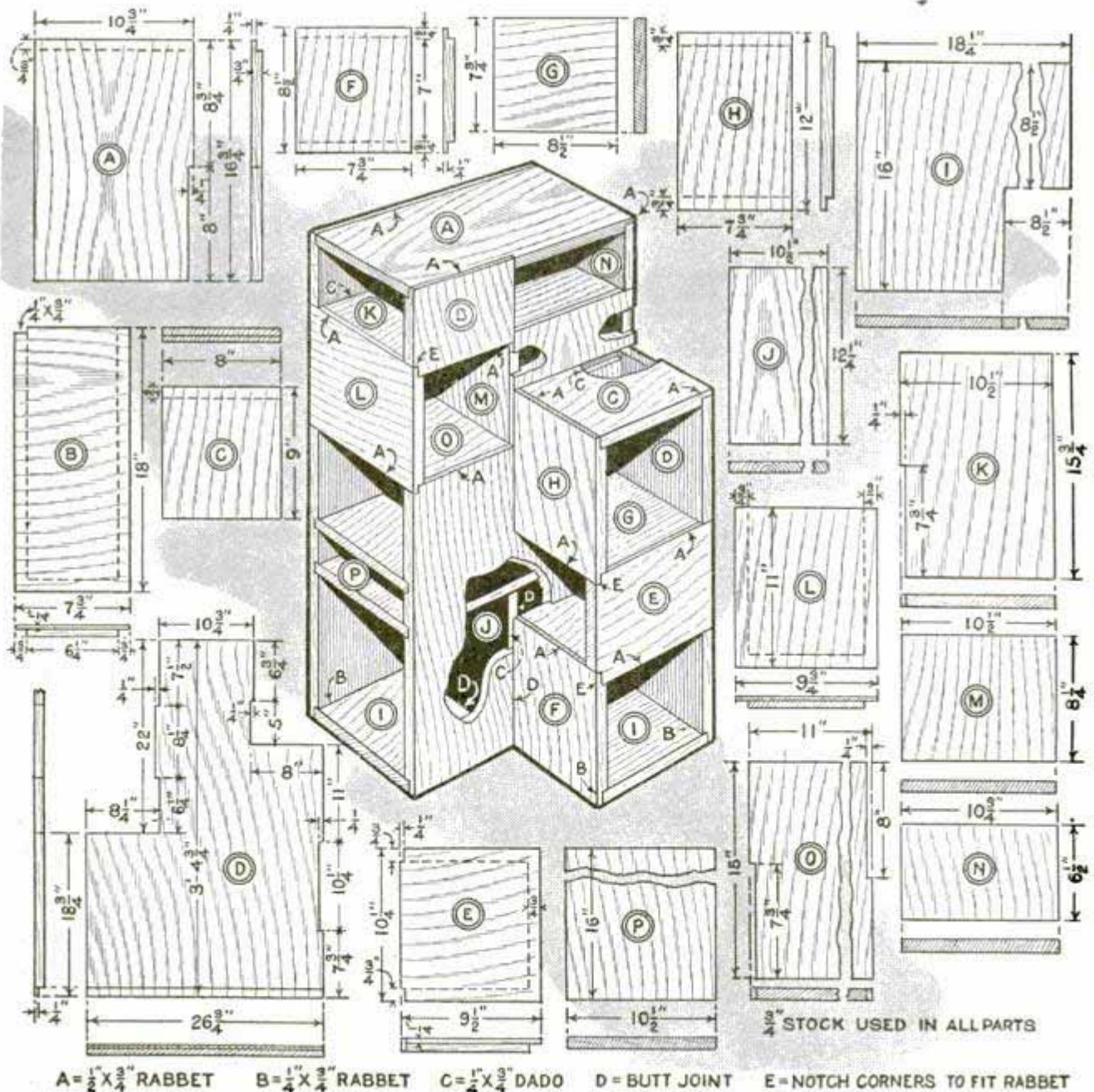


FIG. 5



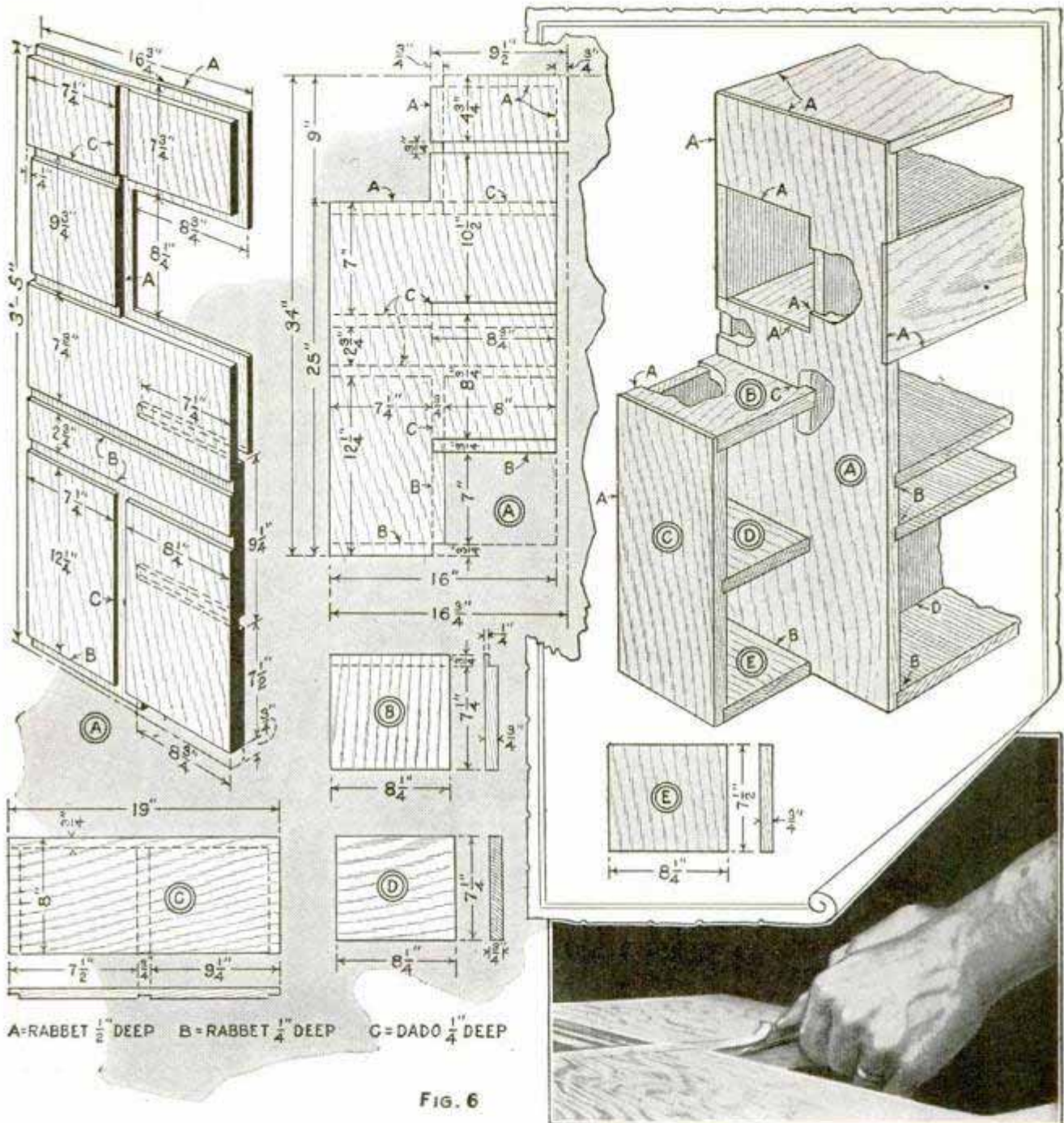


FIG. 6

then rub off reasonably smooth with a putty knife. Allow it to dry for a day or so. Then carefully trim off lumps with a sharp chisel, smooth with No. 1/2 sandpaper, used on a flat block, and finish with fine grit.

Any open joints can also be filled with gesso; in fact, a pretty sorry-looking job of cabinetmaking can be made into a reasonably good surface for painting, and if the reader has bad luck with the bookcase, either in the way of open joints or splintered veneer, he will do well to try filling the defects in this way before abandoning the project.

Sand off all corners to a radius of about

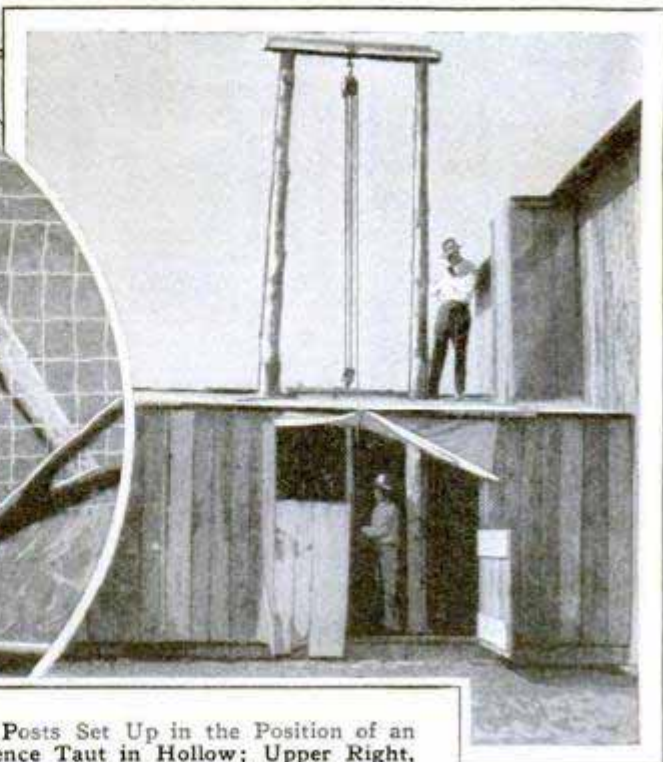
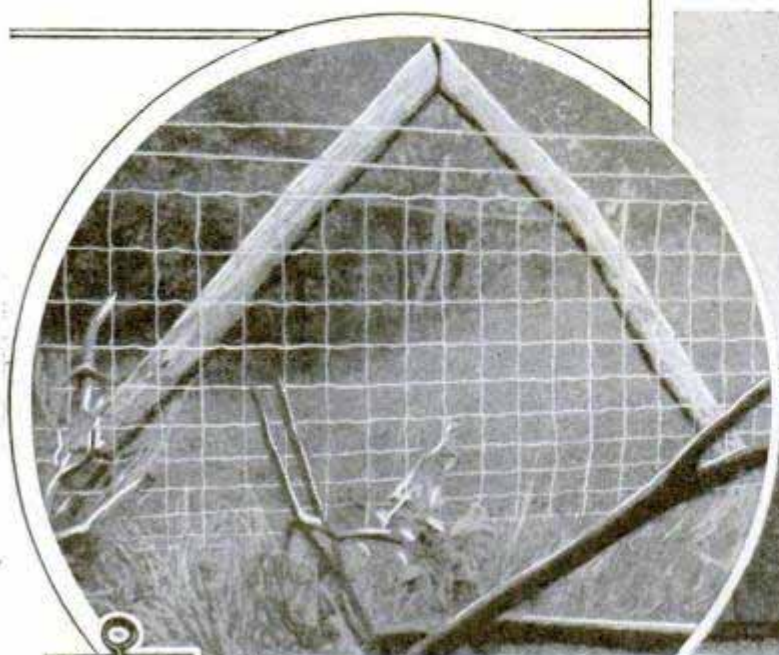
1/16 in. Give three or four coats of flat paint, all well sanded, before applying enamel. The case in the photograph was painted sage-green, and striped on the sides of the top nosing and the top of the heavy base member with orange. The tops of the steps of the nosing, and of the narrow member of the base, were made lavender.

Secure the top to the lower section with small iron strips on the back and a screw through the lower-section top into the bottom shelf of the upper section.

☛ A piece of rosin stirred into melted babbitt will make it run better.



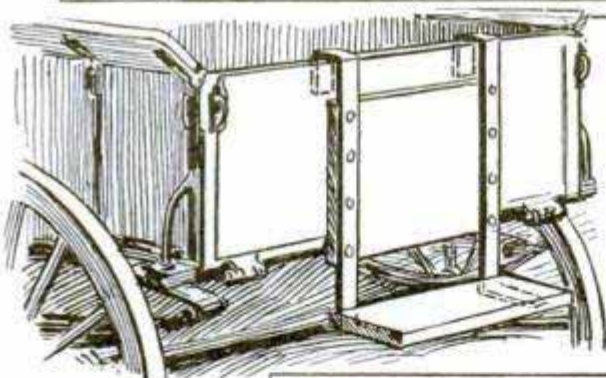
## Time and Labor-Saving Kinks



Upper Left, Two Stout Oak Posts Set Up in the Position of an Inverted "V," Hold Wire Fence Taut in Hollow; Upper Right, Block and Tackle, Passing through the Shed Roof and Attached to a High Support above the Shed, Facilitates Butchering of Large Animals, Which Are Hoisted with a Team of Horses

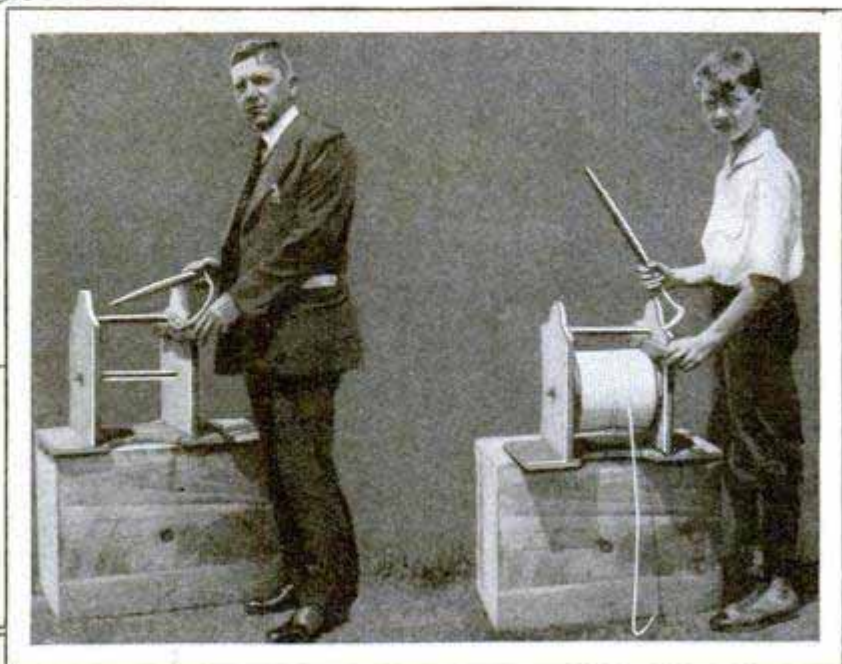


The Dairy Thermometer Can Be Protected against Breakage When Stored Away by Slipping It through Screweyes Located in a Groove Cut in a Piece of Log, the End of the Groove Forming a Support for the Instrument



Wagon Step Made from Pieces of 1-In. Wood, Bolted or Screwed Securely to Two Lengths of Flat Iron, Which Are Bent to the Shape Shown, Is Hooked onto the End Gate of a Wagon; It Has Been Found Especially Convenient for Huckstering and for Delivery Purposes; Being Removable, It Can Be Put Away When Not in Use

Device for Holding a Cordeau Spool While Loading Well Drill Holes; a Wooden Brake Is Provided to Stop the Revolving Spool, a Pointed Stick Being Used to Hold the Brake Down and Also to Punch Holes in Dynamite Cartridges

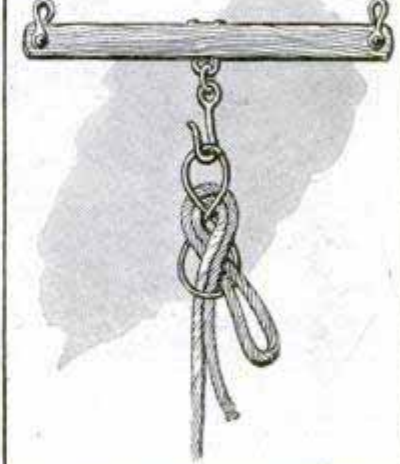




# Found Useful by Keen Farmers



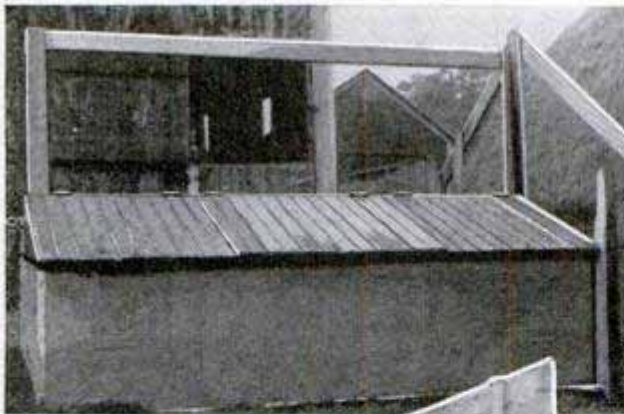
Wedges for Splitting Timber Are Always Handy in This Carrier



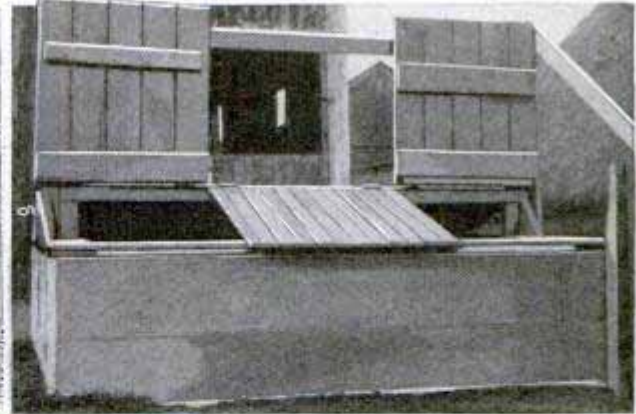
Handy Hitch Permits Quick Detachment, the Rope Being Slipped through an 8-Shaped Iron Rod Welded Together



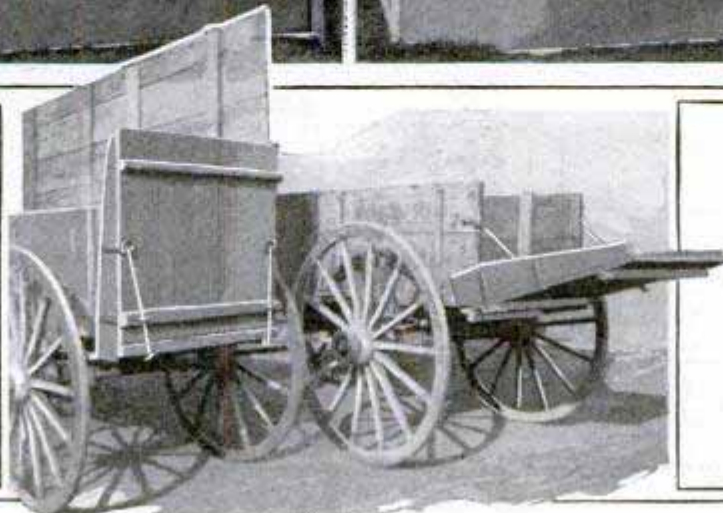
Above, Adjustable Roofs for Haystacks Used by Some Maryland Farmers: Left, Hay Protected by Layer of Corn Stalks; Right, Light Shed Built over Haystack



To Help Prevent Water in the Stock Tank from Freezing, Provide a Hinged Cover of 1-In. Wood; the Cover Should Be Sectional, Which Makes It Much Easier to Handle Than if It Is Built as a Single Large Piece



Wagon End Gate, Called a "Shoveling Board," Saves Labor When Unloading Corn with a Shovel, as the Work of Hoisting the Corn over the Gate Is Entirely Eliminated







Burning Gasoline on Putty Softens It, Thus Facilitating Its Removal

### Fire Softens Putty on Sash

Here is a simple idea that greatly facilitates the job of removing old putty from window sash of which the pane is to be renewed. Get a small oilcan, of the kind in which a light grade of oil is sold, and fill it with gasoline. The hole in the spout of such a can is so small that the stream of gas can readily be controlled. First remove the old glass, then place the sash on a flat bench or table and squirt gasoline on the putty, being careful not to let it run over the wood part of the frame. See that all the windows and doors of the room in which this is done are closed so that there will be no draft. Ignite the gas on the putty with a match. The air coming from all four sides will cause the flame to rise toward the center of the sash, and hence will not scorch the frame. The heat causes the putty to become brown, and if enough gas is used, one burning is usually sufficient to soften the putty so that it can be removed. Do not let the putty cool off, as cooling hardens it.—B. R. Glatts, Weiser, Idaho.

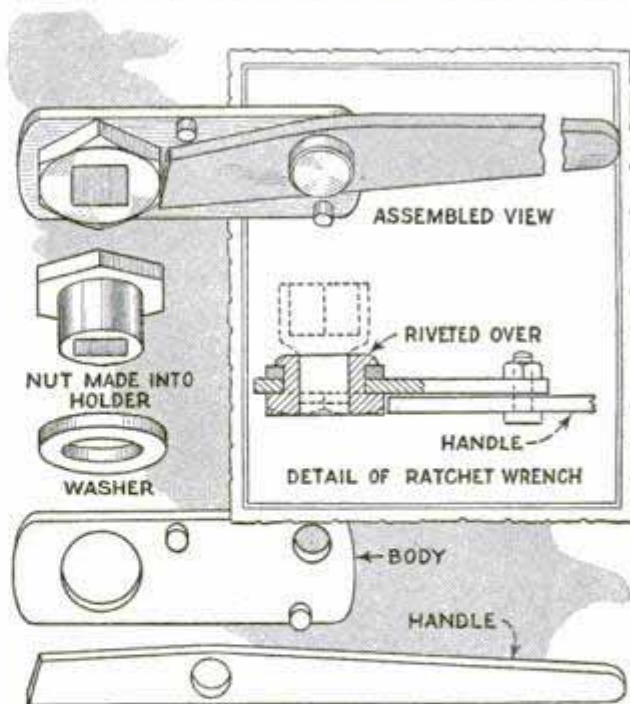
### Making Plastic Filler for Wood

The home mechanic can make a good plastic wood for filling holes, cracks, etc., by mixing sawdust, sifted to the desired fineness, or wood flour if obtainable, with any transparent brushing lacquer. After mixing, the filler should be kept in an air-tight container to prevent it from

hardening. However, if it should harden from exposure to air, it can be restored to working condition by adding more lacquer or lacquer thinner.—J. S. Hagans, Chicago, Ill.

### Improved Ratchet Wrench

With the aid of this improvised ratchet wrench, work can be assembled in a fraction of the time usually required. The wrench can be made by any machinist in an hour or so, and the details of construction are clearly shown in the drawing. The body is made of a piece of flat iron, drilled and equipped with pins at the points indicated. A handle, made of stock of the same thickness, is pivoted to the body by means of a screw. The nut holder is made from an ordinary hexagon nut, filed out square, and part of it is turned down on the outside to fit the hole drilled in the body loosely so that it can be turned easily. After the turned-down end of the nut is slipped through the hole in the body, a washer is placed on this end, which is then riveted over to hold both the nut and the washer in place. In the shop where this idea originated, each machinist has from two to five of these



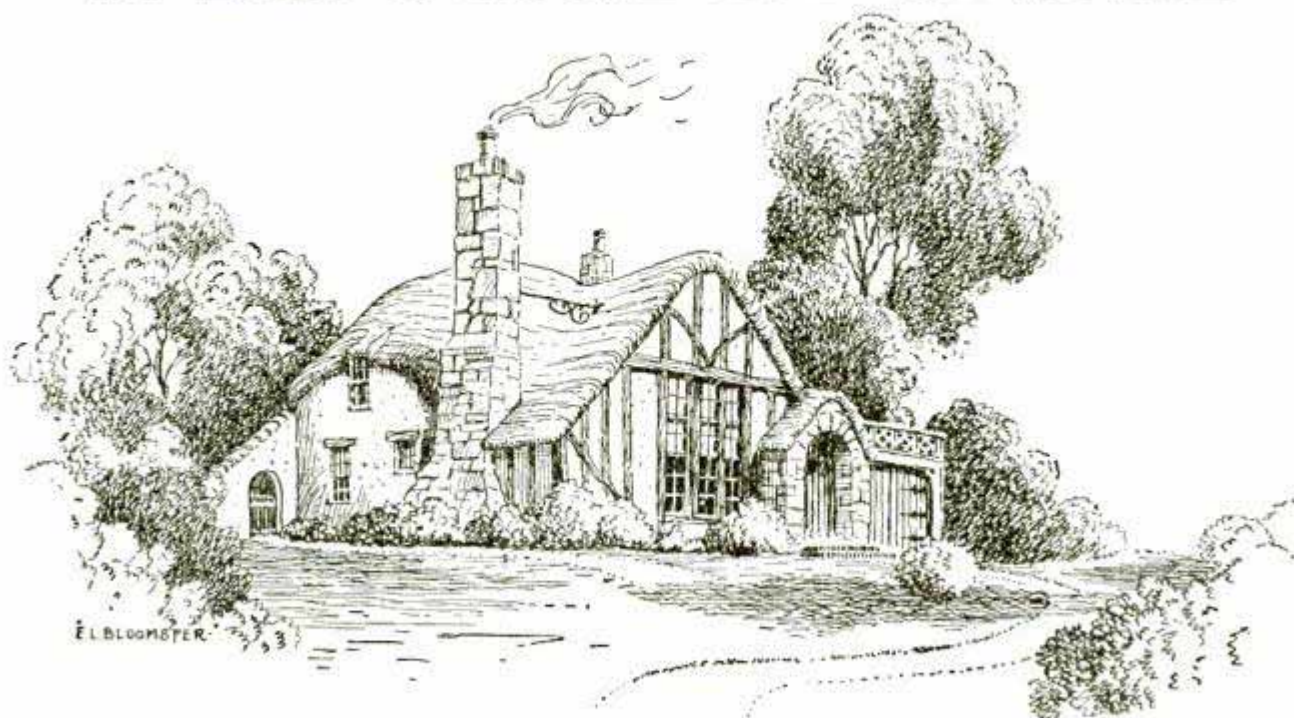
Any Machinist Can Make This Simple Ratchet Wrench Which Saves Considerable Time

wrenches, varying in size to meet the needs of different jobs.



2011

# AT LAST A HOUSE IN IRISH STYLE



Copyright, Popular Mechanics

Plan No. 4-S-40

## Here Is Something New—a Tabloid Plan: Studio Living Room, Attached Garage; House Can Grow as Your Purse Permits

**WHY NOT** a house in Irish style? Sounds interesting, doesn't it? Logical, too. We've borrowed style features from the Spanish, Dutch, English, Italians, Swiss and adapted them to American houses. Why should we longer neglect the fine traditions of the Emerald Isle?

Those sturdy thatched-roof houses of old Erin are in many ways as picturesque as the rambling half-timber cottages of Merrie England or the adobe houses of sunny Spain, topped with colorful tile and built around a patio.

In the little house above, the designers have merged a bit of old-world tang with a dash of American daring and produced a touch of originality—perhaps just those features of style and service at low cost you've been looking for and haven't found as yet. Certainly there's romance and atmosphere here a plenty. But that's not all. Aside from something new, stylistically speaking, the little

house offers you all the efficiency, comforts and conveniences of a roomy, yet reasonably small kitchenette apartment. In addition, the house may grow as your purse permits. In fact, you can make additions to the plan now if you wish.

The architects have given you a thatched roof with slight roll at the eaves, laid with variegated edge grain cedar shingles in brown and green; stucco exterior on metal lath with half-timber effect, reminiscent of old-world solid walls and plaster finish, and a rugged chimney of either fieldstone or brick, to add the external touch of solidity found in many an old Erin house. All of these features have been incorporated in a tabloid plan, and done so skillfully that you marvel at the roominess

and spacious effects in so small a house. Garage and house are all under one roof and can be placed on a lot as narrow as thirty-five feet.

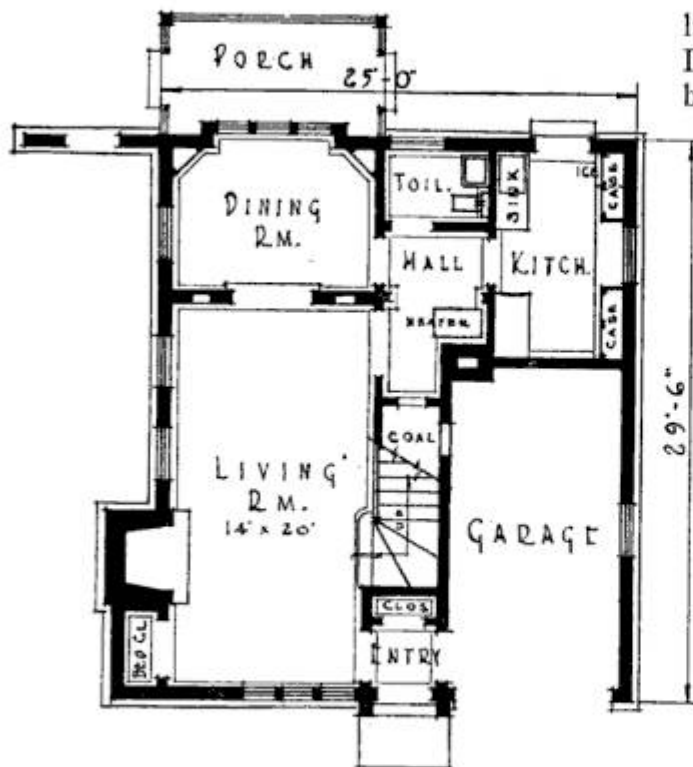
Let's look over the plan and equipment. There's a

### HOW TO GET THE PLANS

To help our readers get started on one of life's most glorious experiences—building and owning a home—Popular Mechanics Magazine will supply readers a one-sheet blueprint of the house here illustrated for \$2. This blueprint does away with the necessity of first purchasing a complete set of plans to find out whether you can afford to build. It contains floor plans, elevations, a section, detail, size of joists, studs, etc., and also a brief specification. Submit it to tradesmen and dealers for building estimates.

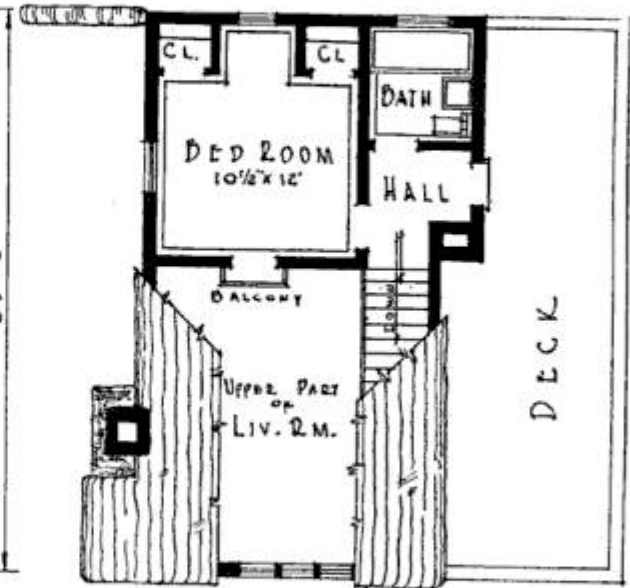
still available. 12/13/33 703





• FIRST-FLOOR PLAN •

living or sleeping purposes in summer. In fact, a second permanent bedroom may be added to this deck now if you wish one.



• SECOND-FLOOR PLAN •

studio-type living room with high ceiling and rafters exposed. A "Romeo and Juliet" balcony opens from the second-floor sleeping room and overlooks the living room below. An open stairway to the second floor is a feature. Next to the fireplace is a bed closet. This may be used for emergency purposes or, if the family is small, it may serve as permanent sleeping equipment. A toilet on the first floor, always a convenient feature, makes the first floor really quite a complete bungalow as far as equipment is concerned.

Notice that the dining-room floor level is raised one step above the living-room level. That's a touch of individuality. A porch may be built to the rear of the dining room. China cabinets flank a spacious window overlooking either garden or terrace. No doubt the full-mullioned window will prove a joy to housewives who appreciate the decorative possibilities of such a feature along with the flood of sunshine it provides.

The second-floor bedroom is planned for picturesque effects. A vanity alcove between the two closets will please the ladies. Opening from the upper hall, there is a door leading to the deck or roof of the garage. By stretching an awning over the deck, this space may be used for

This is a basementless house because it saves fifteen per cent on the cost. A basement may be had if you want one. Notice how the first-floor heater, placed in the rear hall, is served with fuel through a wall opening beneath the stairs. Fuel is stored off the garage under the stairs. The house is of frame construction and fully insulated. Interior finish may be of large surfaced insulation boards or wallboards treated with plastic paint or decorated to suit your taste. This means a saving over lath and plaster.

Summed up, you have in this little house every modern, practical space-saving feature along with a high degree of comfort and a large measure of style. You have it all at very reasonable cost. Recent Chicago estimates say \$5,300 will build the house complete. Chicago prices range from ten to twenty-five per cent higher than prices in many other localities.

**EDITOR'S NOTE:** Popular Mechanics Magazine has prepared a home plan book, "Twenty Popular Low Cost Homes and Ten Commandments for Home Builders." These are selected homes and show labor, space and timesaving ideas. They are \$5,000 homes and less. Send 10 cents in stamps to cover postage. Address Building Editor.



# FOR THE GOOD MAN



Up or down is the same to "Yankee" No. 130-A Spiral Screw-driver. The live spring in handle keeps bit in screw-slot. You just push!

...mechanic  
or amateur

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"Yankee" ingenuity appeals to man's own ingenuity. "Yankee" Tools inspire, encourage him... make him better by making his work easier, better, more interesting!

Only in tools marked with the name "Yankee" can you get "Yankee" ingenuity... "Yankee" durability... "Yankee" economy!

In the "Yankee" Spiral Ratchet Screw-driver, you find "Yankee" ingenuity at its best.



It is a spiral driver—right and left movement, driving or drawing screws simply by pressing on handle. It is a ratchet driver—likewise right or left. It is a rigid screw-driver: 13 inches long or 18 $\frac{1}{4}$  inches, just as you adjust it.

Spring in handle makes it the Quick-Return. Just push! Spring brings handle back for next push; keeps bit in screw-slot.

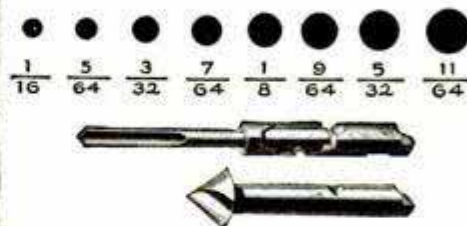
With a bit for small screws, another for medium screws and a third for large, it is *three different size screw-drivers* in each of these various ways of using the tool.

It also drills holes and countersinks the holes for the screw-heads.

No. 30-A—Standard Style.  
Three bits.....\$3.00

No. 130-A—Quick Return.  
Three bits.....\$3.45

Made also in Heavy and Light patterns.



Eight "Yankee" Drill-points for boring holes  $\frac{1}{4}$ " to  $\frac{11}{16}$ ", with special chuck for holding the drills, are to be had for this screw-driver. Also countersink fitting into tool same as screw-bits.

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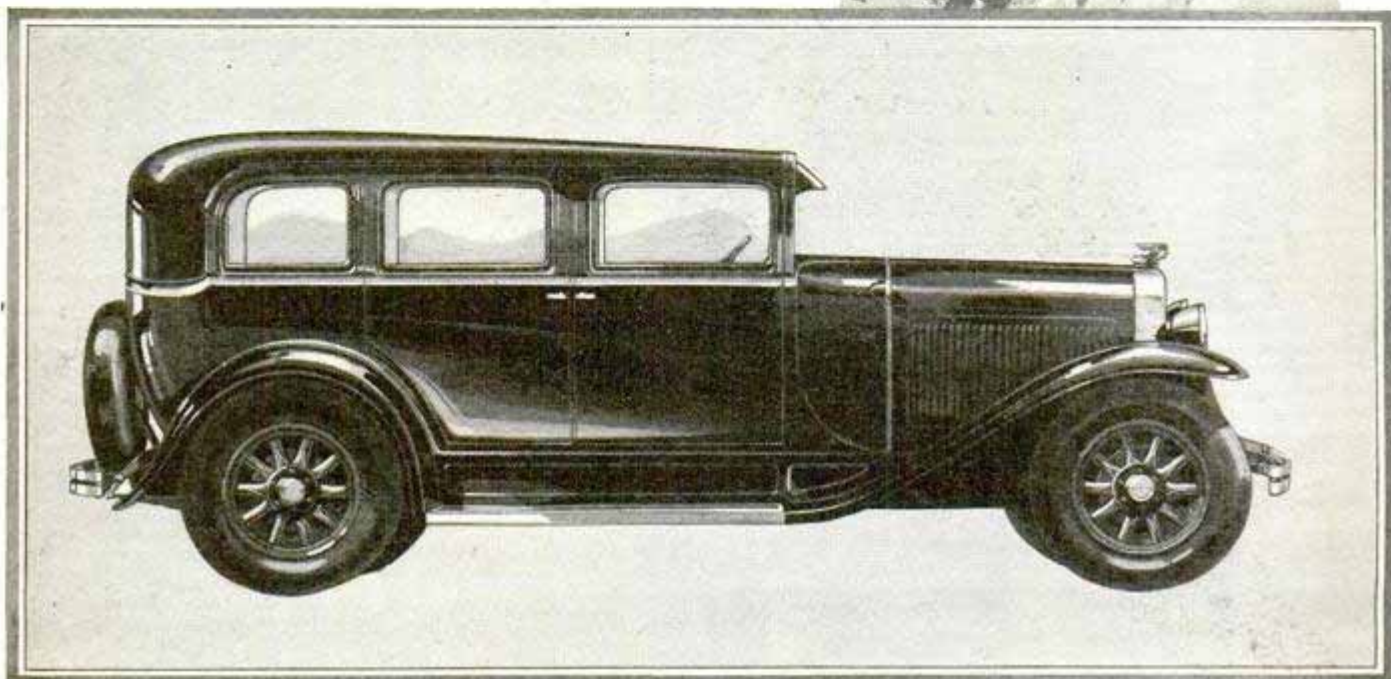


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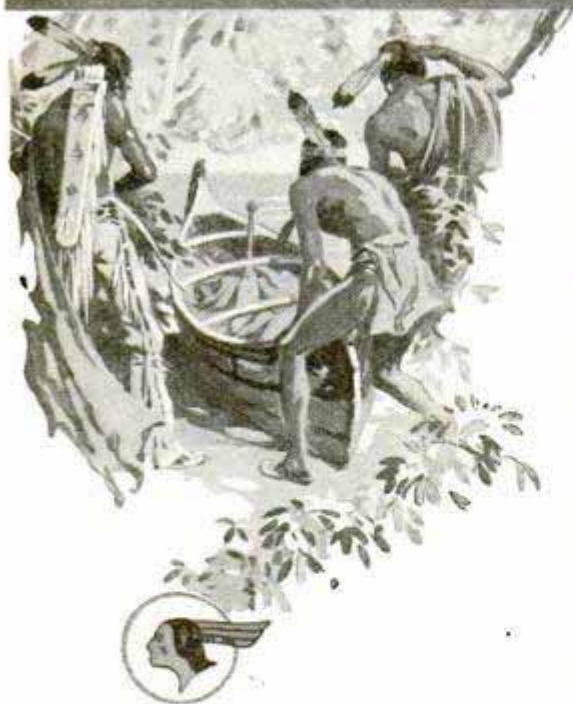
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**THE** Saw Most Carpenters Use now comes to you in new models, improved in every feature.

These new Disston Hand Saws will run with less set . . . cut faster . . . cut easier . . . stay sharp longer, than any other hand saws ever made.

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know this: *The thinner a blade is, if it is stiff, the better it cuts and the easier it is to use.*

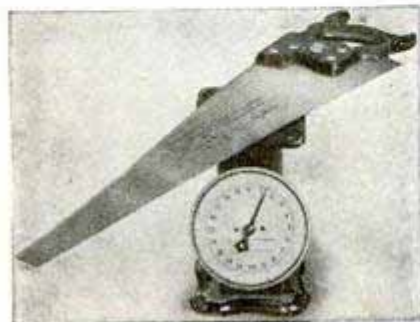
Never until now could you get blades so thin, so stiff, so light, to cut so fast and run so true.

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An illustrated manual on the selection, care and use of tools. Tells how to file and set saws, with much other helpful information. The coupon will bring it.



The new Disston D-8 Lightweight Saw weighs only 1 lb., 7 oz. in 26-inch length. Less weight to push; less work for you. Thinner, yet stiff. It cuts faster and easier, like all the fourteen other hand saws in the new Disston line.

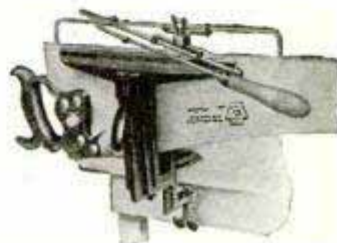
Good tools and correct tools are required for good work. These are some of the Disston Tools needed in the home shop.



**No. 4 Back Saw**—Handiest of all small saws. Fine teeth and stiff back enable you to do the smooth, even cutting that is so necessary for accurate work in cabinet making, etc. Can be used in mitre box. The 12-inch size, 3 inches under back, with teeth 14 points to inch, is most popular. \$3.00.

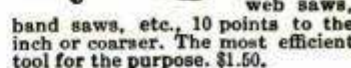


**No. 68 Dovetail Saw**—Used in pattern and cabinet making where extra thin saw with fine teeth is needed. Eight-inch blade, 17 points to inch, is most popular. \$1.60.



**D-3 Filing Guide and Clamp**—Enables any one to sharpen saws correctly, filing each tooth at the same angle. Adjustable for both rip and cross-cut saws. Complete with directions. \$6.50.

**No. 28 Triumph Saw Set**—Gives perfect set on hand saws, back saws, web saws, band saws, etc., 10 points to the inch or coarser. The most efficient tool for the purpose. \$1.50.



**Disston Files**—File your saws with Disston Special Extra-Slim Blunt Saw Files. Special teeth, cut better; parallel sides; extra-slim; Disston-made steel. 5-inch, 20c; 6 1/4-inch, 20c; 6-inch, 25c; 7-inch, 30c. There is a Disston File for every purpose.



**A-10 Lightweight Pocket Level**—Lightest and handiest level. Made of airplane aluminum; cannot rust. Weight only two ounces; length nine inches. Etched lines on level and two plumb glasses are proved accurate. \$1.25.

# DISSTON

Makers of "THE SAW MOST CARPENTERS USE"

Henry Disston & Sons, Inc., Philadelphia, U. S. A.  
(In Canada, address Henry Disston & Sons, Ltd., Toronto)  
Please send me "The Disston Saw, Tool and File Book."

Name .....

Address .....





# Non-stop feet for hard hops

We can't offer you anything as adventurous as Lindy's non-stop hop to Paris, but we can offer you the shoes that champions wear—Keds—the greatest sports and play shoes ever made for non-stop, hard-playing feet. With Keds on your feet, you can take off for tennis or other sport excursions, confident of fast, sure footwork.

Keds are extra fine sports shoes—much better than ordinary "sneakers." Each pair of Keds is made over a special foot-health last—and Keds' tough safety-soles are specially designed to grip the smoothest surfaces, and to absorb the roughest shocks.

With Keds on your feet you can take turns on one foot and not skid. You can lace Keds tight, too—so your feet can't rub and chafe.

Keds offer the most complete line of mod-

els for every indoor sport and outdoor activity, and are made by the world's largest specialists in canvas rubber-soled footwear. You'll find Keds in the best shoe stores in town—at all prices, too, from \$1.00, \$1.25, \$1.50, \$1.75 up to \$4.00.

Keds—Keds—Keds—Look for that name stamped on all genuine Keds.

## Keds

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United States



Rubber Company

The more you pay, the more you get—  
but full value whatever you spend.



*Keds Big Leaguer*

Just as the name implies—a Big Leaguer sports shoe for hard-playing boys. Special safety-sole lets you take turns on one foot. Tough tan toe strip protects against scuffing. "Feltex" insole. Eyelets that won't pull out. A Big Time shoe in every respect.



*Keds Mercury*

The winner in the popular priced field and a wonderful shoe for the money. Tough amber colored sole. Black athletic trimmings and ankle patch. Nickel eyelets. "Feltex" insole. If you're looking for an exceptional value at the price, ask your dealer to show you Mercury.



# Chosen by experts and champions everywhere



The Official Headquarters selected the Plumb Scout Axe as an Official Scout Axe of the organization.



The Garage Man says—

"The off-center head of the Plumb Ball Pein gives me the power I need on heavy work. Yet the tool is so finely balanced I can use it where a false blow would do lots of damage."

GEORGE BREYER, Phila.



The World Champion

Chopper says—

"I give the Plumb Axe the credit for victory in many of my chopping contests. That axe saves me one minute in a five-minute chop."

PETER McLAREN



The Carpenter says—

"My Plumb Nail Hammer fits my hand like a glove. That broad face never misses a nail. Those 'nipper' claws pull anything. It's just the kind of a hammer I would reach for if there were a dozen others around."

DANIEL S. SCHOENER, Glenside, Pa.

## You, too, can do better work with these finer **PLUMB** Tools

Wage craftsmen deal with logical facts. Their time and ability are turned into money with tools.

The price of a tool means nothing. It's the grip...the feel...the performance of the tool that counts.

Carpenters, mechanics, machinists: Their verdict is... "Quality Tools." Many add "I use Plumb."

Or take that famous Champion Chopper, Peter McLaren: His reputation is staked on the blade of his axe. He uses only Plumb.

Or that tremendous organization, The Boy Scouts of America: When selecting a Scout Axe to adopt as Official—they picked Plumb.

Experts and champions everywhere use Plumb Tools! You, too, can do better work, with these finer tools.

Drive a nail with a Plumb. Or pull the slimmest brad, even though it has no head.

Or the hatchet. Sink the blade deep, or slice a shaving.

The Ball Pein for heavy duty; the Plumb Axe for your chopping; the Plumb Official Scout Axe as a handy tool for garage or cellar.

Every one a fine tool. Fine in design, in balance and in finish.

And every Plumb has a safety feature that no other tool contains! When a Plumb Handle loos-

ens (as all handles do) you just turn the patent screw to tighten it again.

Ask your hardware man to show you Plumb Tools. The Red Handle and Black Head will identify them for you.

FAYETTE R. PLUMB, Inc., Philadelphia, U. S. A.



The Foreman Builder says—

"I've never seen a steel blade that bites into the wood, or that holds its edge like my Plumb Hatchet."

AL. MOLLENKOF, Willow Grove, Pa.



## C &amp; L 32

*This is one of the most popular blow-torches we have ever made. It is more expensive than the 158 because it is made for much harder use. It is designed for the man who uses a blow-torch in his daily business and demands not only excellent performance but rugged ability to stand rough handling. 32 contains the most advanced patented C & L blow-torch improvements. It has a red handle with a gold stripe. Sure sign of satisfaction.*

**You're  
investing  
in better and longer  
performance when  
you buy a  
Clayton & Lambert**



AN EXPANDED gas orifice makes a blow-torch a piece of junk. And it's the easiest thing in the world to enlarge the orifice in an ordinary torch. But a No. 32 Clayton & Lambert blow-torch has an orifice that *can't be enlarged*—no matter how carelessly or how tight you close the valve. It's a patented Clayton & Lambert improvement—one reason why you get longer service when you buy a Clayton & Lambert.

In addition to being non-spreading, the orifice will not clog. As you close down the valve the carbon cleans out automatically. The improved orifice is but one of many Clayton & Lambert advancements. Every bit of mechanism is designed to give you quicker, better action. Inside and out, a Clayton & Lambert is built for long, strenuous use. Where a hard bump might occur, a Clayton & Lambert is reinforced.



## C &amp; L 158

*This blow-torch is especially made and priced for the man who likes to do odd jobs around the house, or to tinker with mechanical things. It will last a lifetime if it is not abused. The usual retail price is about five dollars.*

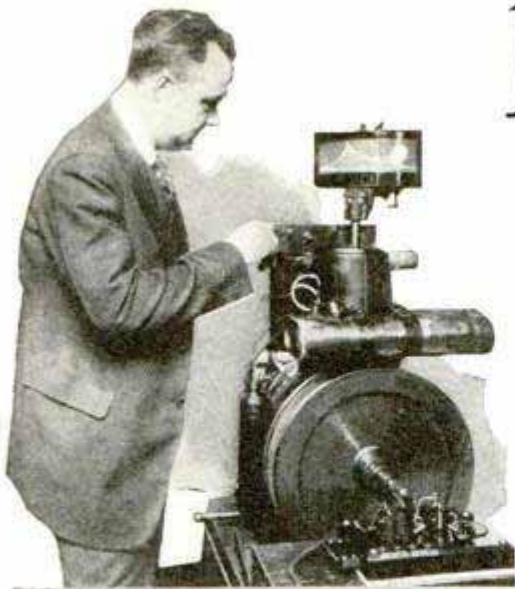
Wherever extra protection should be—you'll find it in Clayton & Lambert.

As an example, all Clayton & Lamberts are made *non-explosive* by a patented method of building the fittings into the tank. The vaporizing chamber is another Clayton & Lambert feature. Its special vein system gives you quicker heat—more heat—and cuts down your fuel bills. You can't see these things which Clayton & Lambert have done to give you the blow-torch you want. They're inside—in the "works," the important part of a torch. But they're there—along with numerous other refinements. They account for superior performance and durability. And that's why Clayton & Lamberts are the most popular torches in the world.

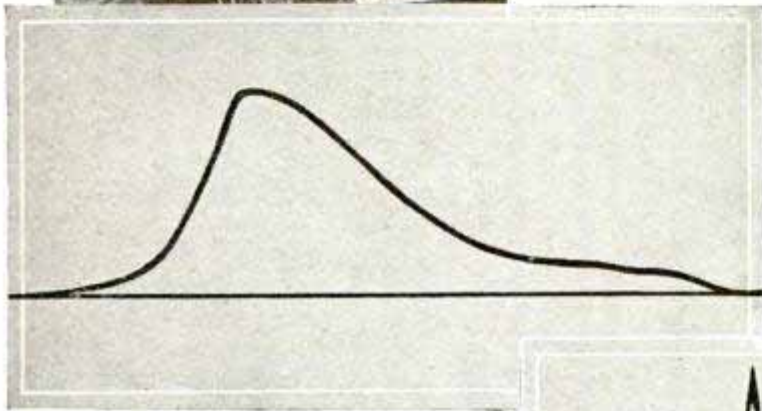
You'll know a Clayton & Lambert by the red handle with a gold stripe. Insist that your blow-torch has that handle—and you'll get your greatest money's worth. At hardware, electrical and automobile accessory stores.

**CLAYTON & LAMBERT**  
MANUFACTURING Co., Detroit, Mich.





# Did you ever see a picture of a "KNOCK"?



© E. G. C. 1929

THAT sounds peculiar, doesn't it? Yet we can get a perfectly good picture of the "knock" in an engine. Those two curious looking diagrams were taken with a Midgley Indicator and show the pressures inside the cylinder of a gasoline engine.

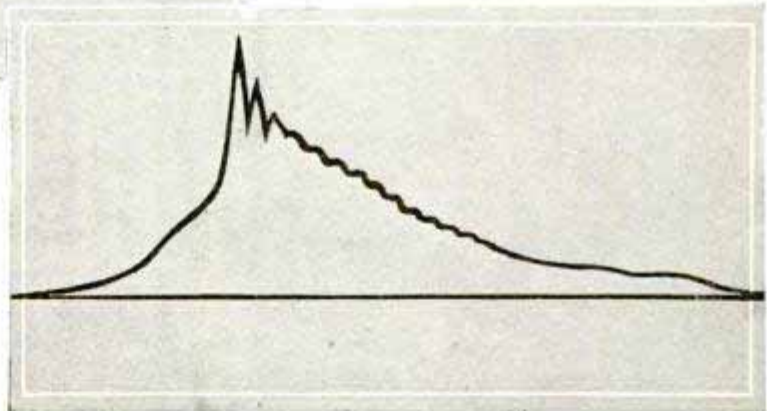
The one on the left is the pressure diagram of a normally operating engine, while the one on the right shows a "knocking" engine. So the "knock" really is the part that looks like saw teeth.

These diagrams were most important. Through them, the scientists in the General Motors Research Laboratories discovered that it was the *fuel* that "knocked"—not the engine. This fact established, they developed Ethyl fluid, whose active anti-knock ingredient is tetraethyl lead.

The end of the long research resulted in Ethyl Gasoline's being put on the market

This is what happens in the cylinders of a gasoline engine when it is running smoothly. The pressure gradually increases after ignition until the mixture is nearly all burned. Then it grows less and less.

But when the gasoline is causing the engine to knock, just see what happens. Is it any wonder that the engine loses power? Ethyl Gasoline prevents that jagged saw-tooth.



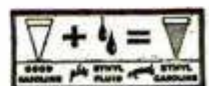
by leading oil companies. It encouraged automobile manufacturers to bring out the present high compression engines and to give the motoring public a new kind of motoring comfort and efficiency. It is called *high compression performance*.

The millions of cars of ordinary compression run better on Ethyl too—for by the elimination of "knock" they develop more power and flexibility.

Ride with Ethyl today.

ETHYL GASOLINE CORPORATION, 25 Broadway, N.Y.  
56 Church Street, Toronto, Canada  
36 Queen Anne's Gate, London, England

# ETHYL GASOLINE



Knocks out that "knock"



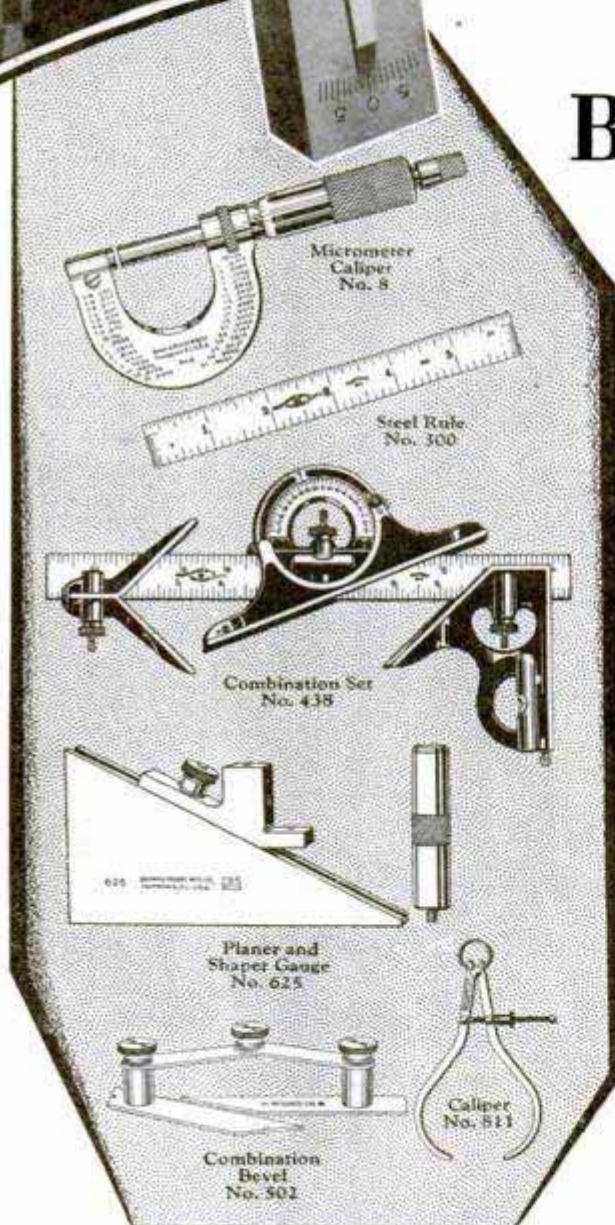


## Better Workmen -- Better Tools

The good workman of today who takes pride in his tools has replaced the workman of the old adage who blamed poor work on his tools.

Present day production sets such a premium upon speed and accuracy that only the worker with reliable, well-made tools can stand the pace.

The Brown & Sharpe Die Maker's Square (No. 552) shown in the illustration is provided with straight or off-set blade. Its handy design gives it countless uses for measuring drafts, tapers, etc. This and 2300 other fine tools are described in Small Tool Catalog. Your hardware dealer will supply you with a copy, or you can get one free from us. Address Dept. P.M., Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.



"WORLD'S STANDARD OF ACCURACY"

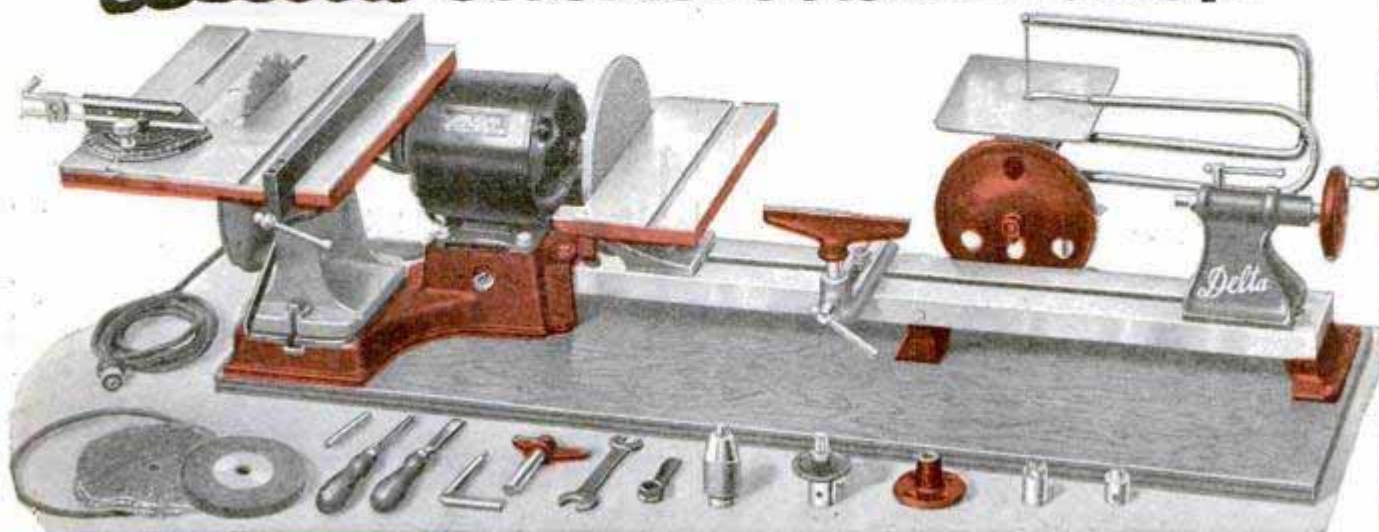
# BROWN & SHARPE TOOLS



# Here is a Husky Man-Size Workshop

## The New 1929 Model-Complete, Practical

### "Delta" Electric Handi-Shop



#### New Features of 1929 Model

found exclusively in the "Delta" Handi-Shop, in addition to the many regular advantages, include:

- New Delta Miter-Gauge (with many new features)
- New Circular Saw Adjusting Lever
- New Delta Adjustable Rip Gauge
- Larger Circular Saw Table
- One-third H. P. Motor
- Larger Triple Foundation Lathe Bed
- 1/2-in. Capacity Drill Chuck

For full details, send coupon below.

#### Make the Things You Have Always Wanted to Make

It's so easy and so quick with the Handi-Shop. Save money on repair work. Earn money in your spare time. Complete instructions and Blue Prints furnished. A few of the hundreds of articles you can make with the "Handi-Shop" shown below.

#### Blue Prints Included



#### Does Everything from Building Full-Sized Furniture to Turning 36" Table Legs



Note the two-shaft motor that permits two or three operations at one time—the heavy Triple Foundation U-Shaped Lathe Bed (no rods)—the practical arrangement of the Circular Saw that permits the cutting of large lumber without interference—the Improved Tilting Tables on the Circular Saw, Sanding Disc, and

Jig Saw. Has automatically oiled bronze bearings and is completely assembled on heavy veneered wood base.

This combination of advantages, plus many more, IS FOUND EXCLUSIVELY IN THE "DELTA" HANDI-SHOP! And now, with the many additional exclusive features of the new 1929 model, this shop is in a class by itself—above all comparison—at a new price that is surprisingly low.

#### 10-DAY TRIAL IN YOUR OWN HOME

without obligation. See how PRACTICAL, how EFFICIENT is this sturdy, full-sized machinery under actual working conditions. Study its many exclusive advantages. You will find the Handi-Shop complete with all necessary equipment for Circular Sawing, Wood-turning, Jig Sawing, Sanding, Drilling, Grinding and Buffing.

#### Easy Terms

Then if you decide to keep the Handi-Shop, you can have your choice of three convenient methods of payment.

#### Send Coupon

at once for FREE beautifully illustrated literature giving complete description of the New 1929 Model "Delta" Handi-Shop, and full details of the 10-day Trial Offer and Convenient Payment Plans.

**Delta Specialty Company**  
Dept. A. 49

1661-67 Holton St., Milwaukee, Wis.



The TWO-SHAFT motor is the practical motor for the workshop. Permits you to carry on two or three important operations at one time without continually dismantling set-up.



Heavy Triple Foundation U-Shaped Lathe Bed (not rods or rails) is guaranteed not to spring or chatter.

#### Write for Valuable Book

crammed with practical information on how to construct useful and decorative objects. Illustrated.

If you want this book, enclose 10c to cover mailing cost. See Coupon.



**Delta Specialty Company, Dept. A. 49**  
1661-67 Holton St., Milwaukee, Wis.

- ☐ Please send FREE illustrated literature on new Delta Handi-Shop. Also full details of 10 Day Trial Offer and Easy Payment Plans.
- ☐ Please send me copy of "How to Make Things with a Workshop." I enclose 10c to cover cost of mailing.

Name.....

Address.....



## BORN March 1, 1929 of Distinguished Parentage



### A Complete Line of Planes by Millers Falls

**M**ILLERS FALLS PLANES are built around the cutting edge. A new process of electrically tempering the steel has produced a cutter that lasts longer and holds a finer edge.



3-point bearing

#### Another New Feature

Next the designers tackled chattering. Now a 3-point bearing of lever cap makes possible hair breadth adjustment that holds the blade at the correct cutting angle and overcomes chatter.

Practical carpenters, cabinet makers, men who love good tools for home shop work—anyone who uses a plane will delight in the balance, comfortable grip and smooth cutting efficiency of Millers Falls planes. Sizes in bench planes from 7 inches to 24 inches, smooth and corrugated bottoms, and 21 models of block planes, cover every plane need.

Sold by  
Responsible Dealers

Millers Falls Planes will be found in the stores of leading hardware merchants.



A new catalog for tool users is ready. Send today for free copy. It shows a wide variety for your choice in 12 major tool lines.

## MILLERS FALLS CO. MILLERS FALLS, MASS.

NEW YORK  
28 Warren Street

CHICAGO  
9 So. Clinton Street

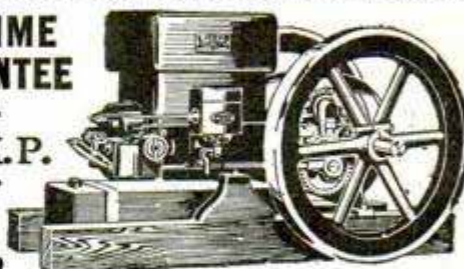
## WITTE ENGINES POWER SAWS AND PUMPERS

300,000 In Use All Over the World

LIFETIME  
GUARANTEE

2-30 H.P.

Engine  
Builders  
Since 1870



WILL DO ANYTHING A STEAM ENGINE WILL DO  
—AND AT FAR LESS EXPENSE.

Easy Terms—No Interest—Quick Delivery

**WITTE ENGINE WORKS**

1744 Oakland Avenue, KANSAS CITY, MO.

## MYERS WONDERFUL SEWING AWL



This little tool is a marvel. Regular hand sewing machine. Will mend anything from thin fabrics up to heavy shoe and harness leathers. Worth its weight in gold. Easily carried in the pocket ready for any emergency. Only \$1 postpaid. Special terms to agents. Big money maker. Write today for territory.  
C. A. MYERS COMPANY, 6339 Woodlawn Avenue, CHICAGO, ILL. U. S. A.

## Makes Old Ford a Tractor

Now you can convert that old Ford car into a useful farm tractor without altering any Ford parts. We furnish the traction wheels, drive gears and auxiliary axle and mountings, ready to clamp on to the Ford frame. Pulls 16' plow.

We supply a  
Belt Pulley also



Write for Free Particulars.  
Shaw Mfg. Co., Dept. PM4, Galesburg, Kan.

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New Models now ready for delivery direct from our factory. Astonishing new prices and terms. Do not buy until you get them.

RIDER AGENTS WANTED to ride and exhibit sample. Save big money. Many models, styles.

Tires wheels, lamps, horns, equipment at half usual prices. Send no money. Write for our marvelous prices and terms.

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Write us  
today for  
free catalog



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YOU PLAY tunes the first day with an easy-playing Conn instrument and the fascinating new instruction methods. No long drudging over scales. Conn gives you the exclusive features found in no others. Choice of famous artists. FREE TRIAL, Easy Payments. Write now for literature; mention instrument.

C. G. CONN, Ltd.,  
431 Conn Bldg, Elkhart, Ind.

**CONN**  
BAND  
INSTRUMENTS



# Now—Make Things at Home with this Wonder Working Shop

**Only \$10<sup>00</sup> down**

**NOW SENT ON TRIAL!**

18" COMPOUND TOOL REST

45° TILTING TOP TABLE SIZE 13" x 11 3/8"

**ACE HIGH IN CHARACTER AND QUALITY**

*Sold Only Direct from Factory*



45° Tilt  
Top Table

3 years of testing, experimenting and improvement is wrapped up in each new Red Jacket Home Work Shop. The finest tools and accessories that can be made go with each assembly order. Red Jacket equipment is designed, tested, approved and guaranteed by Wm. L. Aylward, a nationally known craftsman and manufacturer, who has developed his hobby into a co-operative association of thousands of craftsmen.

## Portable — Interchangeable — Complete RED JACKET Home Work Shop

The new Red Jacket Combination of Electric tools brings you a Red Jacket Band Saw and in addition the powerful Red Jacket Master Drill Motor with direct drive to the Waco Craftsman's wood turning lathe (capacity 9"x36"), also compound and 18" rests, a tilting top mitre saw with both depth and side gauges, scroll and jig saw, and all accessories for both portable and stationary power drilling, buffing, grinding and cleaning. Attaches to light socket and converts your work bench into a complete private tool and machine shop. It is a complete chest full of electrically driven tools designed for the private use of tool lovers and men who create, repair and appreciate handy tools at home.

## Make It Yourself!

Exclusive Features with WACO—

All Aluminum Master Drill Motor  
Perfect Tilting Saw Table 13 x 11 1/2 in.  
Patented Compound Tool Rests  
Finest Quality Hand Tools  
Unconditional Guarantee  
Unlimited Service

—Read Our Code of Business Ethics—  
Ask 7000 Happy Waco Owners



## Mail Coupon for Interesting FREE Literature

Send coupon at once for information valuable to those interested in beautiful handiwork. It is FREE. It tells you now easy it is to operate a Red Jacket set of tools and lists the advantages and privileges that are free to member craftsmen. Don't miss knowing all about Waco. You are invited. **Look out for limitations.** There is only one Red Jacket—one Waco—you will not find WACO TOOLS sold by retailers. All sales made direct from factory.

**The WACO Guarantee**  
If it is not what you want when you get it—send it back.

### SPECIAL CRAFTS COURSE FREE

SPECIAL CRAFTS COURSE and blueprint service is free to Red Jacket Shop owners—all there is to know about handcraft methods, raw materials, woods, carving, sawing, turning, designing, carpentering, decorating, is taught by special correspondence.

**BUY ON YOUR OWN TERMS** Only \$10.00 down. Liberal discount for cash. Easy monthly payment plans. It is no hardship to own a Red Jacket.

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**free  
BLUE  
PRINTS**



The most elaborate and unusual drill motor ever designed for driving power.

**Red Jacket  
MASTER DRILL**



This Handtool furnished where no electricity is available.



Loving Cup Won by Waco Grand Prize of American Master Craftsmen's Assn.

**WACO TOOL WORKS, Inc.,**  
5216 W. Kinzie St., Chicago

Manager, Dept. 104. Please send me all free information and literature on Red Jacket Assemblies and FREE Services.

Name.....

Address.....



# What's all the shouting about?



IT WAS a simple enough hunch — that a lot of pipe lovers secretly craved a milder mixture than they'd been smoking. We gave it to them — literally — a free tin to every man who asked for it. And now so many tobacco connoisseurs are cheering for Sir Walter that we can scarcely make enough of it. Isn't it time you too discovered how good a pipe can be?

## LIMITED OFFER (for the United States only)

If your favorite tobacconist does not carry Sir Walter Raleigh, send us his name and address. In return for this courtesy, we'll be delighted to send you without charge a full-size tin of this milder pipe mixture.

Dept. 177, Brown and Williamson Tobacco Corporation, Louisville, Kentucky



# SIR WALTER RALEIGH

Who discovered how good a pipe can be

It's



milder



## WORLD'S FASTEST "TWIN" BOAT MOTOR

Dad, give your *championship* boy a *championship* motor—a genuine Evinrude, world's fastest twin. On row-boat or racing hull, he'll be up in front—and for fun, not even flying compares with "Evinruding".



Speedi-  
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6 to 45  
M.P.H.

Four "twin" models—2½, 6, 14 and 20 H. P., with light weights of 44, 58, 75, 95 lbs. respectively. A size for any craft, from canoe to small cruiser. Distinctive Evinrude 1929 features include waterproof ignition, easy starting made still easier, torpedo-streamline, pressure-vacuum cooling (no moving parts), ball and roller bearings, self steering.

Easy time payments as low as \$31.10 down. Write for new free Evinrude Year Book.

EVINRUDE MOTOR COMPANY  
2427 27th St. Milwaukee, Wis.



the enjoyment of building your own substantial and safe 20-mile SPEED boat, requires but little spare time. We furnish the materials machined ready to fasten. **\$29.75**

Also larger boats at corresponding attractive prices.  
TRUSCOTT BOAT CO. - ST. JOSEPH, MICHIGAN

## Catch Fish!

Eels, Mink, Muskrats with our new folding galvanized STEEL WIRE TRAP. Write for our FREE TRAP OFFER and Bargain Catalog. \$1 Box of our famous Fish Bait FREE to introduce our traps. WALTON SUPPLY CO., 3502 JUNIATA AVE., ST. LOUIS, MO.

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IT'S A  
PAN-AMERICAN  
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**PAN-AMERICAN BAND  
INSTRUMENT & CASE CO.**  
403 Pan-American Bldg., Elkhart, Ind.





*Advance of 18th Inf., 1st Div., Oct. 11, 1918. Photo U. S. Signal Corps.*

## The story of a typewriter that went to war

By a War Correspondent

**I**T was in July, 1916. The commander of the British Flying Headquarters at Saint-Omer took me for a flight over the lines.

Holding my Corona between my knees I wrote the first description of the front ever typed from the air. During a cruise in a British submarine I typed a complete magazine story while we were nosing about off Heligoland, a hundred feet beneath the surface. A description of the first Zeppelin raid over London I typed at a shattered window by the light of the fires from incendiary bombs.

Throughout my entire period at the front, all my writing was done on my Corona. Because of its portability and dependability, I made it a constant companion.

Many a story banged off hot in a front-line dugout would never have been written if I had waited to reach a spot of greater convenience.

The final year of the war I was

afloat. My Corona saw service on mine-sweepers, destroyers, battleships, and battle cruisers. It recorded the sinking of three U-boats and the surrender of the German fleet.

During my war-time work in Europe I typed an average of 15,000 words a week. In addition to this I typed the manuscript of four books. Yet, in spite of a number of emergency repairs made necessary by violent accidents, my Corona was still in highly serviceable condition when I arrived back in New York in 1919.

\* \* \*

The above is only one of many astonishing Corona stories. We have received thousands of letters from Corona owners, telling about the strange and terrible hardships which Corona has gone through.

A few of the exciting incidents described in these letters are as follows: How a Corona was struck by lightning. How a Corona

fell out of an aeroplane. How a Corona was thrown from a hotel window. How a Corona was retrieved from the sea by a pearl diver. How a Corona went through a Texas sandstorm. In every case Corona survived in serviceable condition.

You owe it to yourself to drop into a store where typewriters are sold and see why Corona is the Champion Portable. The minute you lay eyes on it you will realize why a million people use it—why Roosevelt took one to Africa—why 30,000 Coronas were used in the World War—why more novelists, more newspaper men, more business men, more students in schools and colleges use Corona than all other portables put together.

For a small down payment you can take a beautiful new Corona home with you today. Don't neglect this opportunity. Don't let another day pass without doing something about it. Know *now* the joy of owning a sturdy, speedy, smooth-operating Corona—the Champion Portable Typewriter of the World.

An interesting illustrated booklet called "Corona Typewriters," which describes Corona in detail and contains beautiful illustrations of the new color models, will be sent you upon request. No obligation. Simply mail the coupon below.

L. C. SMITH & CORONA TYPEWRITERS Inc.  
51 Madison Ave., New York, N. Y.

Please send me the free booklet, "Corona Typewriters."

Name.....

Street.....

City..... State.....

412

**CORONA**  
The PORTABLE TYPEWRITER





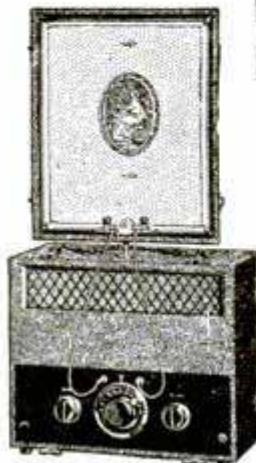
# GREAT After Driving!

When you return from an automobile trip with eyes that are weary and bloodshot, apply a few drops of harmless *Murine*. Within a few moments the tired, burning sensation will disappear, and before long your eyes will be clear again. Millions of bottles of *Murine* were used last year by motorists, sportsmen and others whose eyes were exposed to irritation and strain. Write *Murine Company*, 9 E. Ohio St., Chicago, for valuable free book on the proper care of the eyes.

## MURINE FOR YOUR EYES

 **CLASS PINS 35¢**   
FREE CATALOG SHOWING 200 DESIGNS  
EITHER DESIGN SHOWN, SILVER PLATE 35¢ EA.; 12 OR MORE, \$3.50 DOZ.; STERLING SILVER OR GOLD PLATE, 50¢ EA.; 12 OR MORE, \$5.00 DOZ.; 1 OR 2 COLORS ENAMEL, ANY 3 LETTERS AND DATE.  
**BASTIAN BROS. CO., 893 BASTIAN BLDG. ROCHESTER, N. Y.**

## MAKE BIG MONEY SELLING THE RAMBLER RECEIVER



**AGENTS** for Rambler are cleaning up—making big money on spare time! Here is a one dial, completely self-contained radio receiver that is instantly portable. Compact, equipped with loop and speaker and requiring no outside connections. It has theselectivity, volume and tone quality of higher priced sets—yet costs less than any standard receiver. Write Today for full details on this unusual opportunity to make big money.

**STANDARD RADIO COMPANY**  
756 Roscoe Street, CHICAGO, ILLINOIS

**Single dial control** **7 TUBE** **SUPERPHONIC** **RADIO**  
*All parts mounted*  
**Only \$16.95**  
**COAST to COAST RECEPTION**

**FREE!** Beautiful, massive, walnut table model cabinet, with every Superphonic 7. A \$10.00 value FREE while they last!

**Superphonic 7 is a world beater!** An exceptionally high grade receiver that is amazing the Radio World. Latest 7 tube tuned radio frequency circuit. Extremely selective, marvelous sensitivity. Single drum dial control. Clear and realistic reception guaranteed. An exceptionally beautiful, walnut finish, metal front panel 7 in. x 18 in. Complete chassis. All parts mounted ready to wire. Hook-up wire and colored battery cable included. Value \$60.00; our price \$16.95.

**WIRED OR READY TO WIRE**  
Very easy to wire this set with the instructions we furnish. Just a few connections. Can be wired in a few minutes by anyone. If you would rather receive Superphonic 7 completely wired we will be glad to do so for an additional charge of only \$2.00. Please indicate on your order whether or not you want Superphonic 7 wired.

**SEND NO MONEY—ORDER NOW!**  
We ship right away. Upon arrival pay only \$16.95 plus a small delivery charge. (Foreign countries send \$19.50 with order. We pay shipping charges.)

**Radio Equipment Co., 4611 N. Clark Street, Dept. 10-D, Chicago, Ill.**

## Send for WESTERN RADIO New 1929 Catalog

LATEST and FINEST, nationally known A. C. sets, consoles, cabinets, speakers and accessories at LOWEST PRICES. Catalog sent FREE on request.

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128 W. Lake St. Dept. RPM-4 Chicago

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New proposition offers steady employment and chance to pocket \$18 cash every day. No experience needed. Simply demonstrate and take orders for new Comer Raincoats in your locality. You risk nothing. Keep present job and try in spare time. Smith, spare time worker, made \$14 in 2 hours. No investment. Sample outfit free. Write today.  
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## FREE RADIO CATALOG

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**BARAWIK CO., 104 Canal St., CHICAGO, U. S. A.**



This 260 Page  
Wholesale Radio Catalog  
A Liberal Radio-Education Within Itself!

**FREE**

Containing 75 radio hook-ups, 1,000 illustrations, 6,000 articles.

Build your own with Rasco parts.  
Positively lowest prices in the country.

**Radio Specialty Company**  
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The Same  
Fast, Accurate

## COMPLETE OUTFIT

for home use and  
profitable commercial  
work, including  
planer, saw, lathe  
and electric motor  
and many useful  
attachments

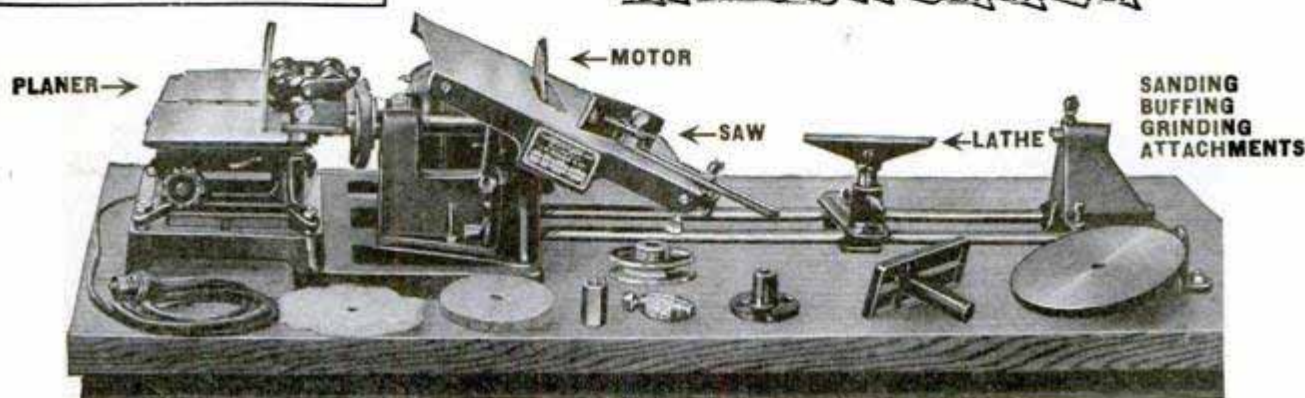
Every kind of woodworking operation

# Make everything out of wood with the famous

## WORKACE

## Electric

## WOODWORKER



## Amazing low price includes everything

This complete all-electric shop costs less than most other outfits and gives you the **biggest value per dollar!** You can prove it at home by actually using the Workace in every kind of woodworking operation, making furniture or other useful and decorative things for your own home and to sell at a handsome profit. The Workace is fast, accurate and easy to work with. Planing, sawing, turning, drilling, grinding, sanding or buffing—you save time on every operation, do better, cleaner work, too!

There's ample power, strength and capacity in The Workace Woodworker to do any job quickly and economically . . . mitering, tapering, rabbeting, beveling, slotting, cross-cutting, ripping—anything! Every unit works from the G. E. motor. All parts are sturdy and well fashioned. The regular Wallace UNQUALIFIED GUARANTEE assures replacement of defective parts for one year. This is a simple straightforward offer—no exaggeration, no red tape—just plain facts that you yourself can prove. If you want to make woodworking your real hobby—or a real source of income—send this coupon for all details of this unusual proposition.

## EASY TERMS

Small Down  
Payment

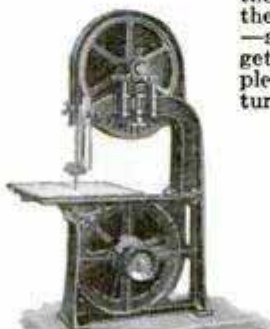
**\$9** Per  
Month

Our terms are all in your favor, a new and revolutionary method of purchase. Many pay for their Workace Shop out of the profits it makes . . . A small down payment brings the Workace complete and ready to set up for immediate use. The monthly payments are so small you'll scarcely miss the money . . . Send the coupon now—today—and we'll see that you get full details and a complete description by return mail!

**\$89**

### Includes all this:

4' Planer  
8" Circular Saw  
6"x36" Lathe  
8" Disc Sander  
6" Buffing Wheel  
5" Emery Grinder  
1/4" Drill Chuck  
1/4" H.P. G.E. Motor,  
110-Volt, A.C., 60  
Cycle.  
Endless V-Belt, two  
4" and one 2 1/4" V-  
Belt Pulleys, Cast  
Iron Sub Base and 10  
ft. Cable with sep-  
arable Plug.  
The Planer and Cir-  
cular Saws are each  
complete units and  
may be purchased  
separately at the cor-  
respondingly low  
price of \$25.00 each.



WORKACE 14" BAND-  
SAW. Speedy, accurate,  
economical. Price, \$75.

## SEND TODAY GET OUTFIT RIGHT AWAY

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Adams St. and California Ave.,  
Chicago, Illinois.

That Workace Electric Woodworker sure looks good to me. I want to know ALL about it, including your easy terms, right away.

Name.....  
Kind of Business.....  
Address.....  
City..... State.....





## Buy Results

You don't buy tools . . . you buy Service. You buy the things that tools will do for you!

. . . and that's why "It Pays to Say Pexto" next time you're after tools. Because Pexto tools are built to Serve for years.

You know it's a case of beauty being more than skin deep, too, . . . they not only look good when you see them at the hardware store, but they're as full of value as only a 110 year old manufacturer can make them.

You'd be interested in looking over booklet "M", which we'll be glad to send you. There are:

Hammers  
Screw Drivers  
Braces

Pruning Shears  
Pliers  
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Squares  
Wrenches  
Chisels

and a host of others.

**"It Pays to Say Pexto"**

**THE PECK, STOW & WILCOX COMPANY**  
Southington, Conn., U. S. A.



### A New Lightweight Electric Drill

**Only \$18.75**

**Weights Only 4 Pounds**

**Universal Motor**

Write for our catalog showing complete line.

A sturdy, practical electric drill, fully guaranteed for one year. Specially designed for light and intermittent work. Weighs only 4 pounds. Built to use in even the tightest corners. Many of the large industrial plants are buying this drill by the dozen.

Uses direct or alternating current, and is supplied to you for 110 to 125 volts, 200 to 250 volts or 32 volts. Fitted with a special Jacobs Chuck. Bore up to  $\frac{1}{4}$ ". Stop and start switch in the handle. Comes complete with 10 feet of cord and socket. Price postpaid anywhere in the U.S.A.—\$18.75.

Send check or money order. If not satisfied return in 5 days and money will be gladly refunded. In ordering, be sure to specify voltage used.

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Dept. 4, 370 Gerard Avenue,  
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**CRESCENT** \$65.00 buys a genuine 4" Crescent bench jointer, complete with powerful universal motor, ball bearings and guard. Ask for circular giving complete description.

Other Crescent machines that will help turn out your wood work to advantage are band saws, saw tables, self feed rip saw, shapers, jointers, variety wood worker, planers, planer and matcher, disk grinder, cut off table, swing cut off saws, borers, hollow chisel mortisers, tenoners, universal cut-off saw, universal wood workers.

**THE CRESCENT MACHINE CO.**  
93 Columbia St. Leontia, Ohio

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This large paint company, selling direct from factory, wants a few more representatives. Opportunity to make up to \$120 weekly right in your home locality. Easy work writing orders for guaranteed paint because sold on credit, no freight and on free trial. Saves users \$1.00 to \$2.00 per gallon.

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We show you how to get orders from property owners, farmers, factory and industrial owners for all their paint needs—House Paint, Barn Paint, Roofing (Paint, Enamels and Varnishes). You can build up a steady trade and establish a permanent business. No stock to carry or money to invest. We even furnish samples free. Write and control sale of Madison Paints for your community.

**THE MADISON PAINT CO.**

Dept. C-12, 6516 Detroit Ave., Cleveland, Ohio





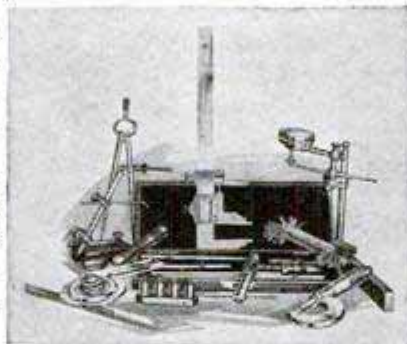
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**T**AKING down a "Whirlwind" or a "Wasp" for major overhaul comes only at twenty, even thirty thousand mile intervals. When it is done, it is done with a thoroughness that has for its basis the heavy responsibility of assuring unfaltering performance.

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*World's Greatest Toolmakers  
Manufacturers of Hacksaws Unexcelled  
Steel Tapes—Standard for Accuracy*

ATHOL, MASS., U. S. A.



# Use Starrett Tools



# NEW MODEL SOUTH BEND

LATHE BUILDERS FOR 22 YEARS

## For the Manufacturing Plant

Tool Room  
General Repair  
Shop  
Machine Shop  
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Electrical Shop  
Engineering Shop  
and  
Laboratory

## Used by Manufacturers of

Automobiles  
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partments  
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State

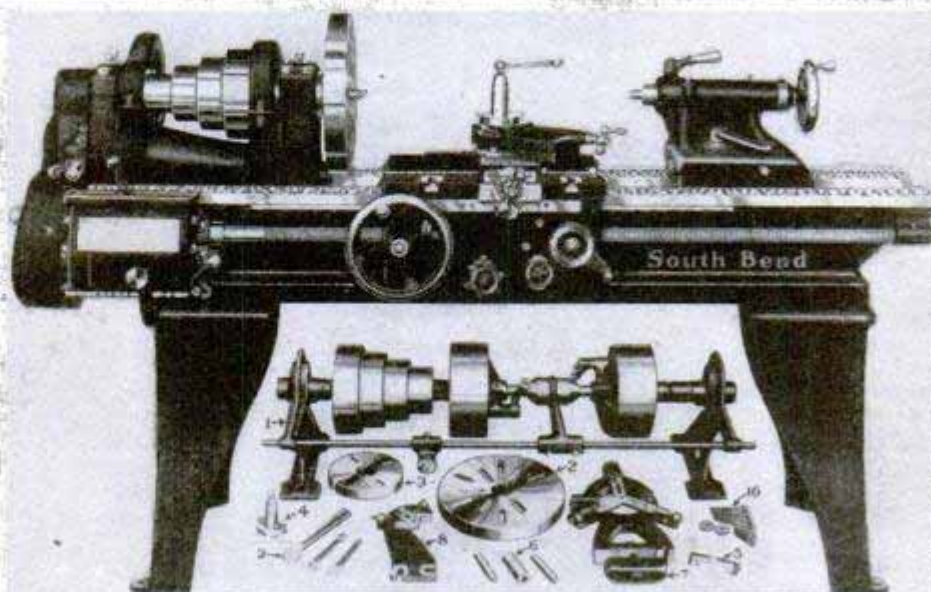
## 96 Sizes and Types

Countershaft  
Driven Lathes  
Motor Driven  
Lathes  
Quick Change Gear  
Lathes  
Standard Change  
Gear Lathes  
Tool Room Lathes  
Gap Bed Lathes  
Brake Drum Lathes  
Bench Lathes

All illustrated  
and described  
in

Catalog No. 89-A

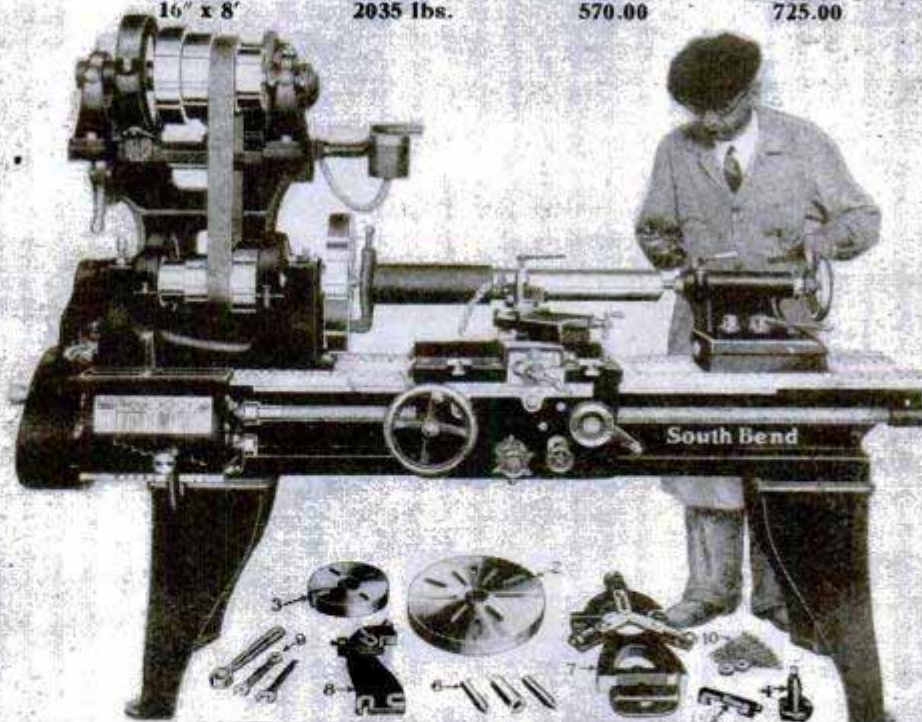
Write for  
Free Copy.



16" x 6' Quick Change Gear New Model  
South Bend Lathe..... \$540.00

## Prices of Popular Sizes of Quick Change Gear Lathes

Size of Lathe	with Lathe Equipment Shipping Weight	Countershaft Drive	Silent Chain Motor Drive
9" x 3'	490 lbs.	\$270.00	\$371.00
11" x 4'	725 lbs.	335.00	455.00
13" x 5'	1110 lbs.	402.00	537.00
15" x 6'	1550 lbs.	490.00	643.00
16" x 8'	2035 lbs.	570.00	725.00



16" x 8' Quick Change Gear Silent Chain  
Motor Driven Lathe..... \$908.00

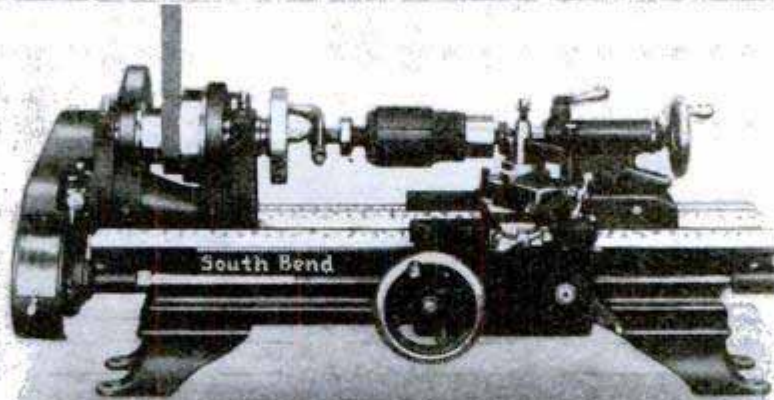
# SOUTH BEND

603 East Madison Street  
New York City, J. E. Beggs Co., 183 Center Street



# SCREW CUTTING LATHES

OVER 43,000 LATHES IN USE



Weight  
375 Pounds

**9" x 3'**

Junior New Model  
South Bend Bench Lathe  
with Countershaft and Equipment

**\$155**

## Easy Payments as low as \$12.40 a Month

Our Easy Payment Plan allows you to install a South Bend Lathe in your shop, by making one payment with the order; the balance to be paid month by month, the amount depending upon the size of the Lathe.

Write today for Catalog No. 89-P, which describes the Easy Payment Plan. Mention size of lathe desired.

The New Model South Bend Lathe is a remarkable tool and is practical for handling the finest and most accurate work. 96 sizes from 9" to 18" swing are available in various types and drives.

These New Model Lathes are used in the plants of the Western Electric Co., General Electric Co., Victor Talking Machine Co., Packard Motor Co., Oldsmobile Co., International Harvester Co. and thousands of other plants.

Operates from  
Light Socket



## Other 9-inch Junior Lathes

The Prices include Lathe Equipment

Size of Lathe	Shipping Weight	Counter Shaft Drive	Horizontal Motor Drive
9" x 2 1/2"	350 lbs.	\$150.00	\$221.00
9" x 3"	375 lbs.	155.00	226.00
9" x 3 1/2"	400 lbs.	160.00	231.00
9" x 4"	425 lbs.	165.00	236.00
9" x 4 1/2"	450 lbs.	170.00	241.00



Write for this 20-page booklet, illustrating and describing the 9-inch Junior New Model South Bend Lathe in all sizes and types. A copy mailed free on request.

9" x 3' Junior New Model South Bend Horizontal Motor Driven Bench Lathe complete, \$226.00.

# LATHE WORKS

South Bend, Indiana, U. S. A.

Chicago, Ill., C. B. Burns Mach. Co., 541 Wash. Blvd.

**SOUTH BEND LATHE WORKS, South Bend, Ind., U. S. A.**  
603 E. Madison Street  
Gentlemen: I would like your net factory price on a Screw Cutting Lathe, Size \_\_\_\_\_  
☐ Manufacturing ☐ Machine Shop ☐ Garage Work  
☐ Catalog 89-A ☐ Catalog 89-P ☐ Catalog 23.  
Name \_\_\_\_\_ Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_



# ATKINS SILVER STEEL SAWS



**ATKINS**  
No. 400 HAND SAW  
SHARP POINT

*Finest saw made. Silver Steel, Sharp Point blade. Perfection handle.*



**ATKINS**  
JUNIOR MECHANIC  
HAND SAW

*Handy, high-grade saw for boys or men. 20 in. polished blade.*



**ATKINS**  
No. 2 BACK SAW

*Rigid Silver Steel blade. Apple wood handle. 8 to 18 in. lengths.*



**ATKINS**  
No. 3 NEST OF SAWS

*Adjustable handle with compass, keyhole and metal-cutting blades.*



**ATKINS**  
No. 10 HACK SAW

*Nickel steel adjustable frame. Non-Breakable or Silver Steel blades.*

## For Your Workshop

The way ATKINS "Silver Steel" Saws cut wood or metal—faster, easier, better—gives a real thrill to thousands of home-craftsmen, who "make things" for pleasure or profit.

Make ATKINS Saws your choice when you start a home workshop, or add new tools. Remember, only in ATKINS Saws do you get the world-famous "Silver Steel" which takes a sharper cutting edge, holds it longer, and outlasts two or three ordinary saws.

Ask your Hardware Dealer, or write us about the saws you need.

### Saw Booklets Sent FREE

"Saws in The Home" is full of suggestions for home-craftsmen. "Saw Sense" tells about saws and their care.

**E. C. ATKINS & CO., Est. 1857**  
426 S. Illinois St., Indianapolis, Ind.

*Atkins Makes the Highest Grade Saws for Every Use; Saw Tools, Saw Specialties, Plastering Trowels, Machine Knives, Grinding Wheels and Files.*

## ATKINS CIRCULAR SAWS

*Circular Rip Saws for fast, accurate work on any machine.*

## ATKINS BAND SAWS

*Silver Steel Narrow Band Saws for small machines. All lengths.*

## ATKINS GROOVER OR DADO HEADS

*The simple, easy way to cut smooth, even grooves from 1/8" to 4" width.*

## ATKINS CIRCULAR MITRE SAWS

*Ideal saw for fine cabinet work. It planes as it saws.*

## ATKINS SAWS FOR METAL CUTTING

*Circular saws in many diameters, for metal cutting machines.*

## In the Far Corners of the Globe CORNWELL TOOLS are Known



**KNOWN** throughout the world for their phenomenal strength and amazing performance, CORNWELL tools are prized by mechanics everywhere. They accomplish remarkable results under the most adverse conditions and do work that no other tools will do. They are made by our special CORNWELL processes, which insure their unvarying quality.

### There Is No Substitute for Cornwell Quality

Mechanics are amazed at the startling tests which demonstrate the superior quality of CORNWELL tools. Your money back if any tools fail to do what we claim.

### We Stand the Risk

You are fully protected by our guarantee that covers every tool. You take no risk. If tools are not exactly as represented send them back and we will refund your money.

## CORNWELL CATALOG - FREE

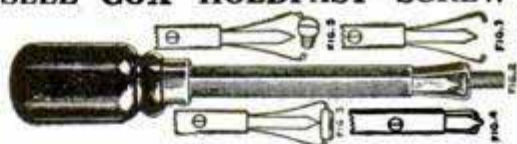
Published in English and Spanish

The Cornwell Quality Tools Co.,  
Dept. 1, Mogadore, Ohio.  
(Formerly at Cuyahoga Falls, Ohio)  
Send me new illustrated catalog with prices on full line of CORNWELL Handmade Tools.

..... Where Employed  
Name.....  
Address.....  
City..... State.....

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### SELL COX HOLDFAST SCREW DRIVERS



Sells on sight to mechanics for Auto, Radio and Electrical Work. Self Holding, Self Releasing.

Send 50c for sample and ask how to get Salesman's Outfit Free.  
S. J. COX Dept. F, FRANKLIN, PA.

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**1/4 H. P. Electric Motor**  
for 110 V., 60 Cycle light circuit at the low cost of \$9.50. A tool that will lighten your chores, connected to your lathe, grinder, pump, washer, etc. Always ready for service.

**ROBBINS & MYERS, Inc.**  
Department A, Springfield, Ohio

## MAKES A COMPLETE MACHINE SHOP

### The New Improved EVERY-USE Electric Motor Attachment

**\$1.75**

Without Chuck,

**\$2.25**

With Chuck

State size. Postage prepaid if remittance accompanies order.

**United Electric Motor Co.**  
178 Centre St., Dept. C-4, New York

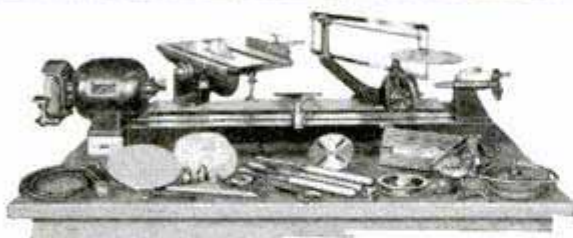


Fastens directly on motor shaft, no pulleys or belts necessary. Holds grindstones, buffs, saws, wire scratch brushes, drills, etc. Serves as pulley. Made to fit 3-8, 1-2 and 5-8 inch shafts.



# AR-CON UTILITOOL

THE KING OF THEM ALL



## A Real Man's Workshop

The Ar-Con Utilitool is **not** a plaything. It is a big, strong, accurate and efficient outfit that will bring complete and lasting satisfaction to you. From the  $\frac{1}{2}$ HP, ball-bearing, repulsion-induction type motor—the most efficient type built—to the wing screws and lock nuts of drop-forged steel, every detail of the Ar-Con Utilitool is designed and built to assure an ample margin of power and strength, and the maximum of accuracy and dependability.

Here is the workshop you've always wanted, but never before could find. And you can buy the Ar-Con Utilitool complete or any of the units separately, on remarkably easy terms. You owe it to yourself to find out about the Ar-Con today. Just write your name and address in the margin, tear out and mail to

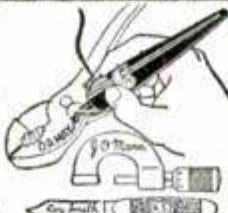
**THE AR-CON TOOL COMPANY**

500 Fassett Street - - - Toledo, Ohio

## BURN YOUR NAME ON TOOLS WITH THE ARKOGRAF

### PROTECT YOUR TOOLS FROM THEFT

Write with electricity any name or design on the hardest and finest tools and instruments, or any metal, like writing on paper with pen or pencil. **Complete Outfit \$3.50**—Prepaid Anywhere. Interesting illustrated circular free. Write today. Agents wanted. **ARKOGRAF PEN CO., 1171 E. Stark St., Portland, Oregon**



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are made in the best possible manner, and are finished very attractively. They are splendid values and are the choice of Machinists and Toolmakers everywhere. Free Catalog.

*Gerstner & Sons*

464 Columbia St., Dayton, Ohio



## Start a Welding and Battery Shop

Outfits sold on the payment plan.

Write for particulars.

Soldering Outfits ..... \$8.00  
Lead Burning Outfits \$18.00 to \$25.00  
Welding Outfits ..... \$25.00 to \$69.20  
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Welding Supplies of every description

**THE SUPERIOR  
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Box 285, Hamilton, Ohio

## SOLDERALL

METAL IN PASTE FORM



Every Electrical Connection needs Solderall for perfect reception  
**The SOLDERALL CO., NEWARK, N.J.**

## SIMONDS CIRCULAR SAWS for the home workshop



**Cut Easier  
Stay Sharp Longer**

**WHEN** you use Simonds Circular Saws in your home workshop, you get the same dependable service—the same perfection of workmanship—that characterizes the Simonds Saws used by leading industrial plants all over the country.

Because Simonds Small Circular Saws are made from specially tempered steel, they cut more smoothly and keep their cutting edges longer than any other saw you can buy. They are fast cutting and accurate. The teeth are uniform and perfectly aligned. Simonds Circular Saws are regularly supplied with several leading makes of portable rigs and home outfits.

For the satisfaction that comes from using cutting tools of the highest quality, insist on Simonds Saws. The name Simonds is your guarantee of perfect workmanship.

Simonds Small Circular Saws are made in sizes to fit all portable and other types of electric sawing outfits. If your dealer can't supply you, we'll gladly forward you any of the Circular Saws described below upon receipt of listed price.

When ordering state size of arbor hole.

6 inch, \$3.30	10 inch, \$5.60
8 " 4.40	12 " 7.00

# SIMONDS SAWS FILES KNIVES STEEL

**SIMONDS SAW AND STEEL CO.**

"The Saw Makers" FITCHBURG, MASS. Established 1832

Branch Offices and Service Shops in Principal Cities





**Rutland Patching Plaster**

*You'll Never Know* where the hole or crack was when you fill it with Rutland Patching Plaster. Makes perfect patch and lasts as long as the wall itself. So easy, too! Just mix with water and use. Anyone can do it. At all paint, wall-paper and hardware stores. Rutland Fire Clay Company, Rutland, Vermont.

# Rutland Patching Plaster



**TAKE-ABOUT Sander** **CUTS SANDING COSTS**  
Five times faster than hand sanding, weighs only 13 pounds and runs off light socket. Patented Belt principle gives smooth ripple-less finish. Write for interesting bulletin.  
**PORTER-CABLE MACHINE CO.**  
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**T**ile for Bathrooms, Kitchens, Mantels, Entrances, etc. now sold direct at wholesale prices to Builders, Tile Setters, Bricklayers, Contractors, Home Builders. Our Free Catalog illustrates complete line in full colors. Estimate and complete setting instructions furnished free.

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**TILE CATALOG FREE**

# PARKS

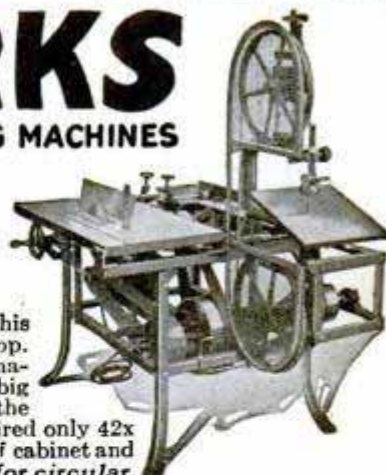
**WOODWORKING MACHINES**

*Cabinet Shop  
Special No. 10*

**\$290**

*With Motor*

You ought to have this handy Parks in your shop. Compact, complete machine designed like a big production outfit at  $\frac{1}{4}$  the cost. Floor space required only 42x72 in. Does any kind of cabinet and joinery work. Write for circular.



**The Parks Woodworking Machine Co.**

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Canadian Factory: 338 Notre Dame East, Montreal

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**only \$39**  
**GREATEST OFFER EVER MADE**  
**Make Money!** Wood is valuable. Saw 15 to 20 cords a day. Does more than 10 men. Ottawa easily operated by man or boy. Falls trees—saws limbs. Use 4-hp. engine for other work. **30 DAYS TRIAL.** Write today for FREE book. Shipped from factory or nearest of 10 branch houses.  
**OTTAWA MFG. CO., 1741-W Wood Street, Ottawa, Kansas**

# The Handy Tool - Torit Torch "23"

Uses acetylene only from a Presto auto tank. Finest thing you ever saw for Radiator and Battery Repairing, Soldering, Light Brazing, Heating, etc. Complete with 4 tips, soldering copper, hose, connections. **PRICE (except tank) \$7.50**  
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177 W. THIRD ST. ST. PAUL, MINN., U. S. A.




# Engines & Motors

## Big Catalog No. 30

Illustrating Electrical, Mechanical and Model Maker's Supplies, Small Steam & Gasoline Engines, Motors, Generators, Lathes, Drill Presses, Bench and Band Saws, etc., 16-32 & 64 Watt Dyna-Motors, School Projects, Engine Castings, Motor Parts, etc., Books, Blue prints, Brass and Steel Tubing, Gears, Pulleys, Hangers, Experimental Material. Send for Copy, Mailed anywhere for 10 cents, refunded first order.  
**LOOMIS ELECTRIC & MFG. CO., 2822 N. CALIFORNIA AVE., CHICAGO, ILL.**



# NEW! TORPEDO VIAL LEVEL

100% Accurate — 100% Reversible either side or end up. A revolutionary Invention. Makes other levels out-of-date. Cost no more. Full particulars and big Tool Catalog Free. Write today.  
**CATALOG GOLDBLATT TOOL COMPANY FREE**  
1530 Walnut Street, KANSAS CITY, MO.

# ELECTRIC LIGHTS ANYWHERE

110 Volt—complete plant with all Wiring, Fixtures and Lamps for 7 rooms \$147.50, Direct-To-You.  
*Ideal for Farms, Camps, Summer Homes.*  
Also runs Household Electrical Appliances. Install it yourself. Write for circular.  
**D. W. ONAN & SONS \$147.50**  
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# PUT THIS WORKSHOP IN YOUR HOME

## FREE For 10 Days-No Deposit!

### A New and Improved Workshop

Here is a workshop built to a standard of perfection—accurate in operation—most durable in construction—easy to operate. It is absolutely dependable and will withstand severe constant service. Try it for ten days at our expense and you will be convinced of its superiority.

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Furniture manufacturers use MAC—the Popular Mechanic Workshop—for making furniture models. Manual Art Schools use it for instruction. Home workers use it for pleasure and profit. Carpenters use it for making repair parts, spindles, chair legs, cabinets. It is ideal for making all kinds of furniture.



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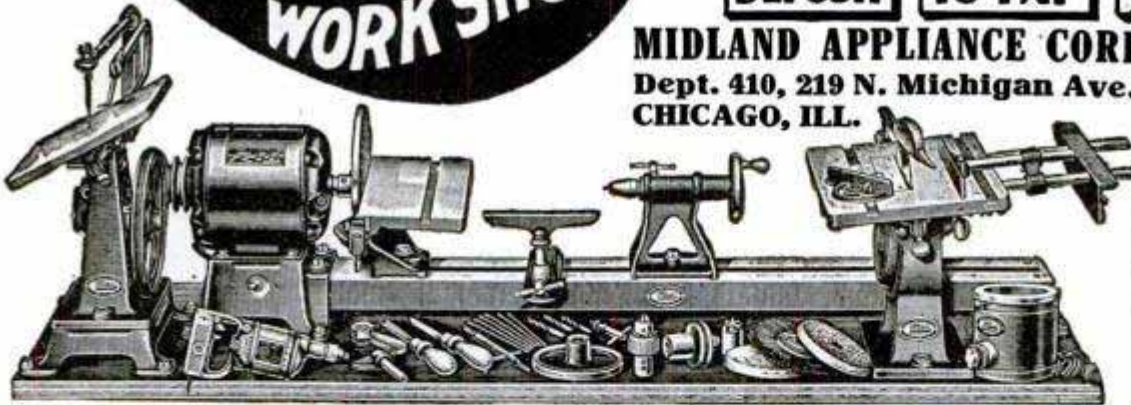
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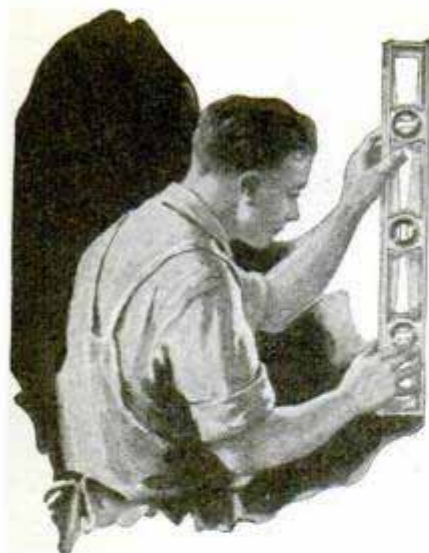
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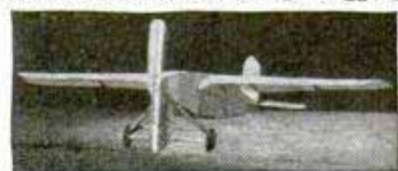
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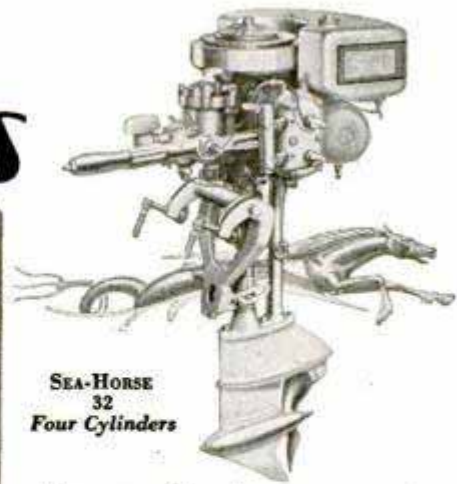
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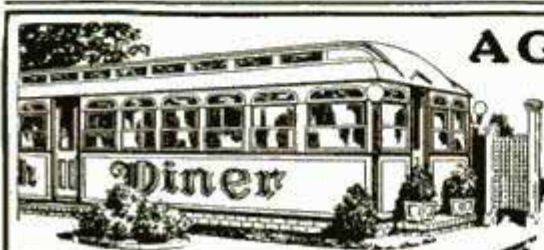
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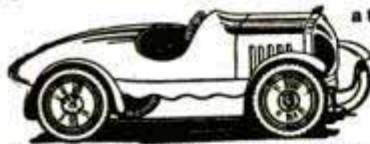
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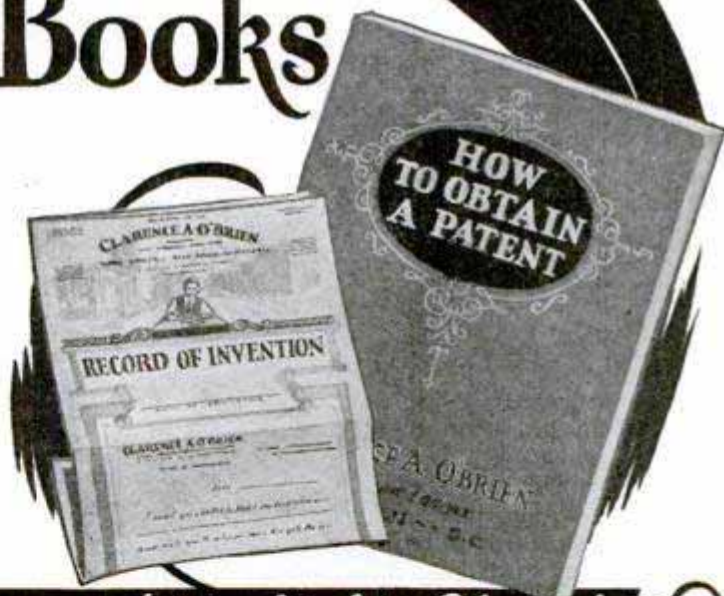
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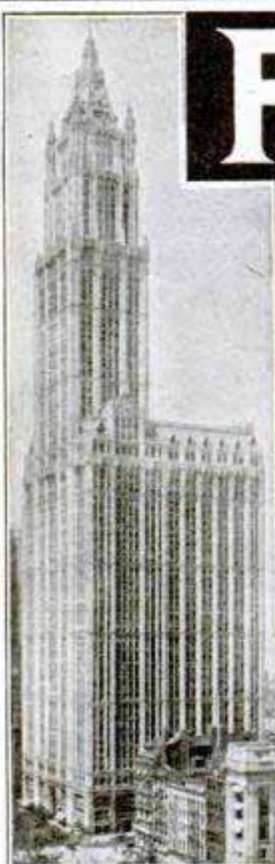
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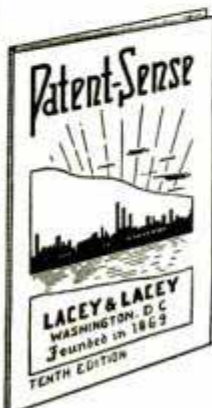
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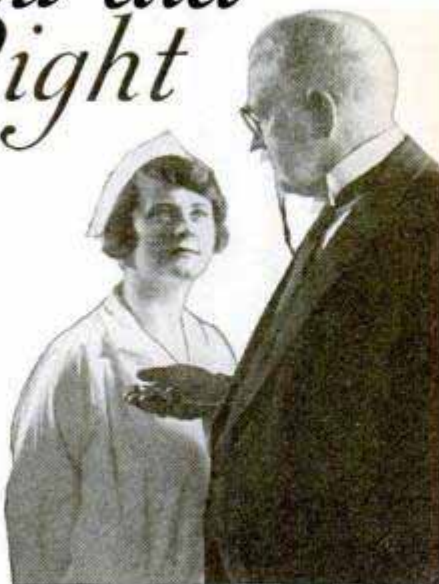
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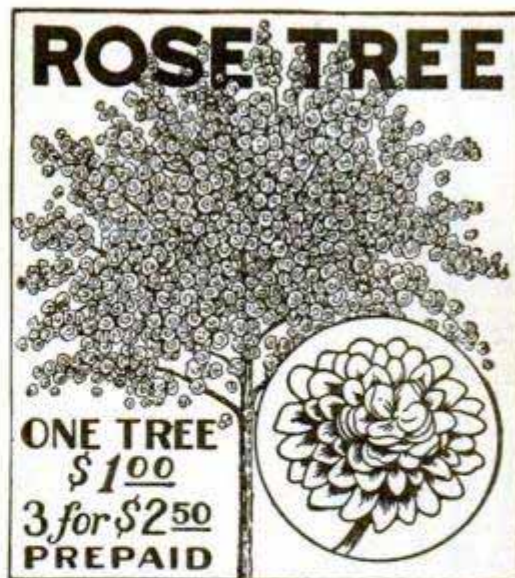
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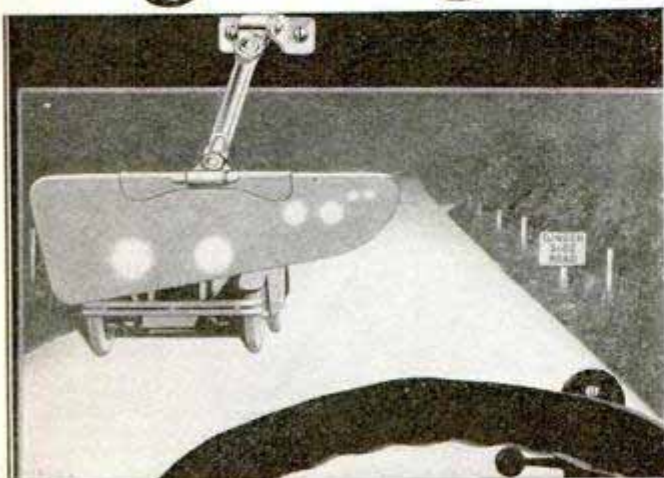
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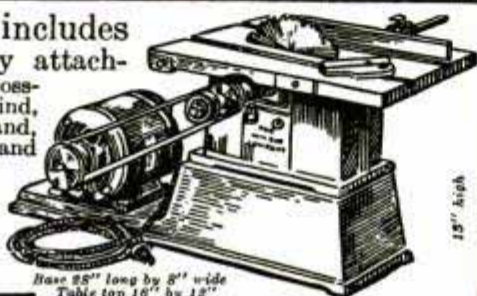
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Sold to all kinds of stores, theatres, hotels, etc. Cash or time sales. \$18.50 to \$22.50 commission on each order. Good men can average \$100 every week.

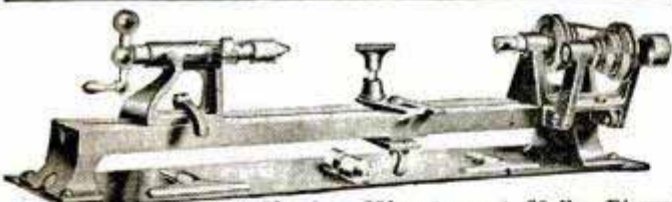
## MORE \$5000.00 MEN NEEDED!

Only five orders a week puts you in the \$5000.00 class. We work with our men—give them detailed instructions—show them in an easy, understandable manner how to figure and quote prices—and help them sell through our intensive cooperation. Commissions on sales are paid promptly. This is a dignified proposition—a permanent connection—and the money earning possibilities are unlimited.

**Write Today** Let us send you our beautifully illustrated book of Dazzler Electric Signs and full details of big money making proposition. Some exclusive territory available. Write or wire at once!

**Dazzlers Are The Lowest Price High Grade Electric Signs On The Market And Are Sold To Merchants On Easy Terms.**

**Chicago Sign Sales Co.**  
Dept. 70, Charlotte, N. Carolina



**\$21.15**



9' swing, 25' centers, wt. 60 lbs. Biggest Lathe value yet. Send 6 cents for 48 page catalog on lathes, saws, etc. Largest line of small lathes in America.  
**SYPHER MFG. CO., Dept. D, TOLEDO, OHIO**

## Boils 50 Gallons In Less Than Hour

No Other Compares With This

## Improved Oil Burner

Use Ordinary Kerosene or Coal Oil

**[Burns Outdoors as Well as Indoors]**

**THE** most remarkable Kerosene Burner ever built. Boils down apple cider, maple syrup, molasses, etc., in half the ordinary time. Ideal burner for dairies, butchers, indispensable on the farm.

**PRODUCES TERRIFIC HEAT WITH SILENT BLUE FLAME**

**NO NOISE  
NO SMELL  
NO SMOKE  
NO SOOT**

So efficient it produces twice the amount of heat of City gas at half the cost. So simple anyone can install and operate. Double generator assures continuous operation without shut-downs. Nothing to wear out, starts in a jiffy, will last a life time. Every burner guaranteed fully. Write for special introductory price and free catalog of outdoor utility and kitchen stove oil burners.

**HOME MFG. CO., Dept. 3013, 20 E. Kinzie St., CHICAGO**



**Mail Coupon Below** for details of the \$5 to \$50 a day "Brown Bobby" Plan.



**You  
Can Make  
\$50 to \$200  
a week**

**AT HOME**  
... SPARE TIME ...

**WANTED**—a reliable man or woman in every community to make *nationally advertised* "Brown Bobby" greaseless electric doughnuts to fill orders for wholesale and retail trade. Chas. Minch, Fla., cleared \$3,000 in 3 months; Iota Blanton, Ia., \$400 in 26 days; H. G. Landroth, Ia., \$60 a day. Inexperienced but ambitious men and women everywhere are cleaning up by the "Brown Bobby" plan.

## No Training Needed We Furnish Everything

No experience or baker's skill needed. You simply add water to the prepared "mix" we send; marvelous doughnut maker does the rest. You can start making doughnuts at home by the "Brown Bobby" process; later on you can rent floor or window space, or open shop. Small investment required to show you mean business. *We will help you sell your entire output!*

### Typical Successes

Mrs. A. J. Miller, N. Y., cleared \$24 a day, buys a hotel with "Brown Bobby" profits.

Mr. F. D. Morrow, Ill., rents grocery window, clears \$40 a day.

K. E. Giering, Ohio, opens store. In 2 days is working day and night to supply demand.

Chas. Ryan, N. J.; clears \$100.00 weekly in his store after paying help.

## INVESTIGATE This Proven Plan

For the sake of your future, write for details now! Learn what others are doing, what you can do, how in a few weeks you can be earning up to \$1,000 a month. Now is the time to get started. Don't wait.

## Mail Coupon NOW!

**GEORGE HARDY, Director of Distribution.**

**Food Display Machine Corporation,**  
Dept. 1354, 500-510 N. Dearborn St., Chicago

Gentlemen: Please send me without cost or obligation the "Brown Bobby" plan by which I can make \$50 to \$200 a week.

Name.....

Address.....

City..... State.....



# Used RADIOS

as low as

## \$9.90

5 tube

UNHEARD of  
VALUES!

Here it is! Positively the greatest offer ever made in Radio. For only a few dollars, you can own a set that will prove amazing for quality and performance. Beautiful table models. Our low prices are made possible only because we buy for spot cash—because we have exclusive contracts for all sets taken in trade by dealers—because we buy manufacturers' surplus merchandise—and because we are dealers in bankrupt stock.

### TAKE YOUR CHOICE

**LOT 1**—Here are included many famous make radios. All have been thoroughly tested and are guaranteed to be in perfect condition. Can hardly be told from new. Formerly sold at very high prices. **\$14.90**

**LOT 2**—In this lot are some very excellent receivers, all in perfect working order. You'll agree they are worth far more and could not be duplicated at twice the price. **\$12.90**

**LOT 3**—If you are handy with tools, you can make a still greater saving. Just a few minutes of your time in making some minor adjustments and you'll have a set that you will be proud to own. This lot sold as is. **\$9.90**

### 100% MONEY BACK GUARANTEE

As one of our customers you must be satisfied. If upon receipt of your set, you do not feel that it is the biggest bargain you ever bought, return the set and we will promptly refund your money. Could anything be more fair?

### SEND NO MONEY—ORDER TODAY

Take advantage of these amazing values now! We ship promptly. Upon arrival pay price of set ordered plus a small delivery charge. (Foreign countries send Money-Order with order.)

CHAS. HOODWIN CO., 4240 Lincoln Ave., Dept. 410, Chicago  
DEALERS IN BANKRUPT RADIO STOCKS



## She's a Clipper!

Famous ship of Donald McKay

Raking masts and graceful hulls built for speed. Clear plans make it easy to assemble finished hull, masts, spars. All parts you need to make a model true to line. Finishes 20 in. long. Sent with white metal figurehead for \$11.60 plus 5 lbs. parcel postage.

Send for clippers, galleons, frigates, Barbary Pirate, and sailboats that sail.

**ROY HANCOCK**  
323 Douglas Ave., Portsmouth, Va.

☐ Rush Flying Cloud—check enclosed  
☐ Send illustrated catalog—10c  
☐ Send Barbary Pirate—\$6.89 and postage

Name .....

Street .....

City ..... State .....

# Thompson BEATS the World on BOATS

THOMPSON BOATS

## CATALOG FREE!



**OUTBOARD MOTOR BOATS**—A complete line of strictly up-to-date racing models. Also some entirely new models for general pleasure use with speed of a racer. Built strong, staunch and durable, and absolutely safe.

**Rowboats** \$44.00 and up—

The most complete line ever offered, at real money-saving prices.

**Canoes** \$48.00 and up—

Some all wood, others canvas covered. Light, swift, safe, strong and durable. Choice of many distinctive color combinations.

**Motor Boats**—

With or without Engine. Fast, handsome craft at money-saving prices.

**CATALOG FREE — SAVE MONEY — ORDER BY MAIL**

Please state the kind of boat you are interested in (30)

→ TWO LARGE FACTORIES ←

**THOMPSON BROS. BOAT MFG. CO.**

213 Ann St.  
PESHTIGO  
WISCONSIN

(Write to  
Either Place)

113 Elm St.  
CORTLAND  
NEW YORK

## LIGHTING FIXTURES

Ready to hang

Direct from the manufacturer. Completely wired, including glassware. Send for new catalogue No. 29. Just Reduced Prices. Special Proposition to Dealers.

**Erie Fixture Supply Company, Inc.**  
Station A  
ERIE, PA.

**SPARE OF FULL TIME**

## BIG STEADY PAY

Big pay for live, energetic district salesmen. Show made-to-measure all-wool suits at \$23.50 up. Super values that sell on sight. Cash for you daily. Liberal bonus. Customer satisfaction assures fast growing repeat business. Handsome, double size swatch selling outfit FREE. Write us at once.

**PIONEER TAILORING CO., CHICAGO, Dept. 1116**  
Congress & Throop Sts.

# \$23.50 ALL WOOL SUITS



**Complete Outfit \$9.65**

# PAINT WITH AIR

## New Simplified Easy Way!

with improved Payntgun! Quickest, easiest way to paint ever discovered. Anyone can put perfect smooth brilliant surface on car, furniture, woodwork, etc., with lacquer, varnish, paint or enamel. No experience needed—years of painting skill built into the Payntgun. New exclusive features cut painting time in half. Sturdily built—compact—convenient. Powerful spray specially designed for easy sure control. Turns painting jobs into play. Fully guaranteed.

FREE

Folder on Skillful Home Painting—Write for yours today!

**HAYWOOD EQUIPMENT COMPANY**  
2345-E Ogden Avenue, CHICAGO, ILL.

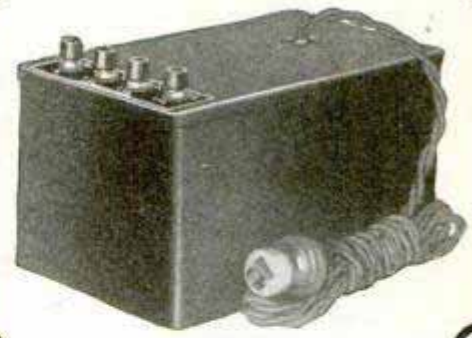


AGENTS WANTED



# Enjoy the Thrill of Electrified RADIO at Small Cost!

Why discard your present good set when you can electrify it for only \$6.85, and also banish forever all the annoyance and expense of buying new "B" Batteries?



## HEAR IT! TEST IT! COMPARE IT!

### RESULTS

Your Eliminator is giving excellent service. It is doing all you claim for it and I am pleased in every way. It is a great pleasure to listen to my radio as long as I wish and not have to worry about "B" batteries and have plenty of voltage at all times.

Ellis B. Mosby,

Camden, Mo.

The Eliminator bought from you several months ago is working fine. It gives wonderful tone and plenty of power without any hum at all. Am well pleased with it and would not part with it for a higher priced one.

Almsey Paul,

Corona Del Mar, Calif.

Words cannot express how well satisfied I am with your Eliminator on my 6-tube Super-Heterodyne.

Minnie Schade,

Ashton, Ill.

Eliminator works wonderful on our GREBE.

Alex S. Stirling,

Romeo, Mich.

Electrified radio is what everyone wants now. Forget noisy, interrupted reception. You will see how easily you can electrify your set when you write us for proof and the truth about all electric radio.

## OVER 100,000 TOWNSEND "B" POWER UNITS NOW IN USE

Hooked up in a few minutes. Use same tubes—No changes. You will be amazed at the improvement in reception. Pure, even tones. Crystal clarity. Plenty of volume. Surprising distance. Freedom from hum and line noises. New radio enjoyment.

## TRY IT FREE!

We are so sure the Townsend will do all we claim for it that we give you the privilege of testing it out for ten days at our risk. A new radio joy awaits you. Don't put up with second rate reception any longer. You don't have to—when you can have electric reception with a Townsend "B" Power Unit for the astounding low cost of \$6.85. Mail coupon for complete information TODAY!

**Approved** and passed by the rigid laboratory tests of Radio News, Popular Radio, and Other Authorities.

ONLY  
**\$6.85**  
@ Complete

TOWNSEND LABORATORIES, 4/29  
Dept. 15, 713 Townsend St., Chicago, Ill.

Please send me full information on the Townsend "B" Power and Free Trial Offer.

Name .....

Address .....

City.....State.....

TOWNSEND LABORATORIES, Dept. 15, 713 Townsend St., Chicago, Ill.

## You will be delighted with your H&A Band Saw

Here's the Saw that's doing exceptional work in thousands of factories, shops and manual training schools—a high grade precision tool; portable, motor driven, reasonably priced. Skilled or unskilled, it will help you do better, faster work—at a saving.

Write for attractive price offer.

HESTON & ANDERSON  
604 Market Street, Fairfield, Iowa



\$4.99  
WITH  
100  
CART-  
RIDGES  
Free!

22cal. Blank Automatic

You need no license or permit to own this 6-shot Automatic. Use for fun or self-defense. Keeps away tramps. Frightens thieves. Scares away dogs—a real home protector. Fool your friends. Same as an expensive automatic in construction, finish, appearance, durability; automatic magazine loading and ejection of cartridges; instant and powerful report. Guaranteed absolutely safe. Send no money. Pay expressman \$4.99 and small shipping charge for automatic with 100 cartridges. JENKINS. 621 Broadway, New York, Dept. 4-J-25



## 43.8 Miles on 1 Gallon of Gas

(Affidavits on File)

This Simple Device Can Be Installed on All Cars

**AGENTS—Make \$250 to \$750 a Month**

**\$15.00 a Day Guaranteed to Producing Distributors**

**TRIAL COSTS YOU NOTHING**

Send quick for Proof and big money making proposition.

Get FREE Tire Offer

Write for Full Information

Blanche Auto Devices Co., 154 E. Erie St., Dept. 845-E.B., Chicago



## 1,000 Hotel Positions Open!

**H**OTELS, restaurants, clubs, apartments, hospitals, institutions, schools and colleges everywhere need trained men and women. Over 70,000 high-class positions paying \$2,500 to \$10,000 a year open annually in the hotels of the United States. Nearly one and three-quarter billions of dollars' worth of NEW HOTELS, CLUBS AND INSTITUTIONS being built this year will need over 200,000 trained men and women. Hotels start you at salaries up to \$3,500 a year, with living usually included. At any time there are over 1,000 hotel positions open.

### Previous Experience Unnecessary

You can have one of these fascinating, big-pay positions. Thru our Simplified Study Plan we give you the valuable knowledge that it has taken some of the most successful hotel men years to obtain. Age is no obstacle—young and old alike have equal chance for success. Past experience absolutely unnecessary. A common school education is all you need. We train you in your spare time and put you in touch with big opportunities. All of your training under the personal supervision of Clifford Lewis, who has been appointed Managing Consultant by over 300 hotels throughout the United States. Our students employed by leading hotels everywhere.

Send coupon today for Free Book, "Your Big Opportunity," showing how we can train you for one of these splendid positions, and explaining our Money-Back Agreement.

The Original and Only School of Its Kind in the World  
—Charter Member National Home Study Council.

—FREE BOOK COUPON—

LEWIS HOTEL TRAINING SCHOOLS,  
Room BK-385, Washington, D. C.

Send me without obligation the Free Book "Your Big Opportunity."

Name.....

Address.....

City.....State.....





## Where's the can of PLASTIC WOOD?

(Reg. U. S. Pat. Off.)

What if a fixture has pulled out—and towel racks, glass holders, and other fixtures set in tile do come loose?—it is easy enough to fix them permanently with Plastic Wood. Just clean the hole to remove loose plaster, wood, or dirt and fill it up with Plastic Wood—the amazing household product that handles like putty and hardens into solid wood. Then, when hard, screw the fixture back in place—or, if it has no screws, “set” it while the Plastic Wood is still soft.

It comes in two forms—Plastic Wood, of natural wood color, and White Waterproof Tile Cement, which dries to a hard flat white, and is particularly useful around loose tiles and other places in a tiled bathroom where a white finish is desired.

### Plastic Wood Solvent

When working with Plastic Wood, keep a can of Plastic Wood Solvent on hand to soften it if it hardens too rapidly, to thin it if necessary, and to clean the hands and tools after using. In 25 and 50 cent cans.

Handles  
Like  
Putty



Hardens  
Into  
Wood

1 lb. can \$1.00

1/4 lb. can 35 cts.

At Hardware and Paint Stores

ADDISON-LESLIE CO., 414 Bolivar St., Canton, Mass.

## An Opportunity for Young Men

An old, established firm offers a chance to sell a standard product, and grow

Only one class of men will be interested in this advertisement. These are the young men,—perhaps in their twenties and fresh from college,—who are wondering what line of business to enter. Or the young fellows who now have an inside position and want to get out in the selling game to broaden themselves both in income and experience.

In short, they are the class of men who are willing to work and learn and build their future with us. And to such men we wish to tell our story.

The John B. Wiggins Company has, in the past seventy years, developed a national business in all forms of copper- and steel-plate engraving. Most of this has been carried on up to the present time by mail. But now we desire to establish direct representation and to engage a few clean-cut young men who will be a credit to us. We prefer that they be in their twenties, and sufficiently well educated to be able to converse intelligently. Each will be assigned to a certain district in his locality. Here he will contact prospective customers and show them, from the beautiful book of actual engraved samples, our complete line.

Experience is unnecessary; we would prefer to teach the men we select our own way of selling our quality product. Their remuneration will be on a commission basis.

Each will be given an opportunity to advance and connect himself permanently with this firm.

Reply by letter only, please. If you are such a young man, we would be glad to have a letter directly from you mentioning as a reference some prominent business acquaintance.

**THE JOHN B. WIGGINS CO.**

Established 1857

1167 Fullerton Ave. Chicago, Ill.

## “You’re there with a CROSLEY”

Genuine neodyne battery type Bandbox \$35

AC Electric power speaker GEMBOX \$65

**THE CROSLEY RADIO CORPORATION**

Cincinnati, O.

Powel Crosley, Jr., Pres.

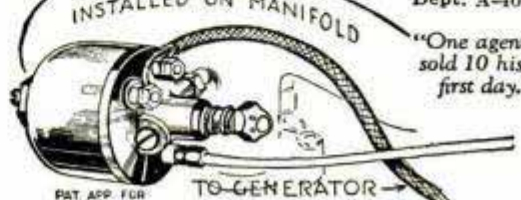
## Stop that Gas Eater!

**USE Electro GasSaver on your car and save half your gasoline.**

Aurora engineer invents new, dependable and electrically controlled accelerative gasoline saver which saves its cost many times over. An article of merit selling at \$12 and not to be confused with cheaper types with absurd claims. Nothing like it on the market. One model fits all cars. Works automatically. Combines vaporizing principle using generator as current for heating and controlling. Increases gasoline mileage 1/4 to 1/2 thru efficient combustion. Gives faster getaway. More power. Eliminates hard carbon. Lasts a lifetime. Installed in 15 minutes. Exclusive territory to agents. Big money maker. Write now for sample offer.

**ELECTRO GASSAVER, Mfrs., Aurora, Ill.**

Dept. A-40



“One agent sold 10 his first day.”





# DON'T MAKE



EVERYBODY who goes into the woods without a compass is bound to make a 7-mile circle sometime — and sometimes it's dangerous. Don't take chances.

*Taylor*  
Compasses

are fine instruments of American manufacture, meeting the need of sportsmen or hunters. Models to fit any requirements.

## Leedawl Compass

Untarnishable silvered metal dial, heavy tempered steel point on which the needle operates; screwed top (no dirt or moisture can get inside with this style of top) white metal case, snap in beveled crystal glass, open face.

Price \$1.50 Each

*Taylor Instrument Companies*  
ROCHESTER, N. Y., U. S. A.



Canadian Plant: Tyco Building, Toronto

Manufacturing Distributors in Great Britain, Short & Mason, Ltd., London



### Screwdriver Resistance for Your Radio

Don't guess at resistance values! You can't fool electricity. Instead, use a DUPLEX CLAROSTAT, with its double-barrelled resistances instantly adjustable to any values by means of an ordinary screwdriver. Neat. Compact. Practical. Inexpensive. Foolproof. Just the thing for B and C voltage adjustments, whether your set is new or old, factory built or home-made.

Write regarding the DUPLEX CLAROSTAT and other CLAROSTAT radio aids, and we shall send complete literature. Or ask your local dealer to show you the CLAROSTAT line.

**CLAROSTAT MFG. CO., Inc., Specialists in Radio Aids**  
286 N. 6th ST. : : BROOKLYN, N. Y.

**CLAROSTAT**  
Reg. U. S. Pat. Off.



### New! "AERO-CALL" SHORT WAVE CONVERTER

**Factory-Built, Ready to Plug Into Your Present Radio Set**

The Aero 1929 Converter is a compact factory-built short-wave adapter equipped with special short-wave coils. It is designed for both A. C. and D. C. sets. Operates perfectly on all sets without motorboating, by an auxiliary filter system control. It can be plugged into any regular radio set. This amazing radio instrument now makes it possible for you to reach round the world—England, Germany, Holland, Australia, Panama, Java and many foreign stations are some that are tuned in regularly on short wave. Permits you to enjoy international programs and many others from coast-to-coast that your regular receiver cannot get. What a thrill it is to plug this into a tube socket on your regular set and instantly be in another world! No change or wiring required. All complete, ready to operate, tubes and coils hidden, no apparatus in sight, except the neat, golden brown, compact metal cabinet in crackle finish. Size, 9x5 1/4 x 2 1/4 in. The only converter we know of that really works on all sets. Two models—A. C. and D. C. Write for Catalog and literature, or send \$25 and name of your dealer, Model A, without tube, for A. C. sets \$25.00 Model B, without tube, for D. C. sets \$25.00 at leading dealers and jobbers.

**AERO PRODUCTS INCORPORATED**  
4611 E. Ravenswood Ave.  
Dept. 449  
CHICAGO, ILL.

# Improved Performance with New Improved CHAMPIONS




**T**HE new improved Champions are designed to maintain new car performance and to meet all conditions of the most advanced engineering. The far-reaching improvements, the time-tested and exclusive superiorities of the new improved Champions are so great as to warrant immediate equipment with new Champions—no matter what spark plug you may now be using. The new improved Champions will show actual savings in gas and oil, which will more than offset their cost. To secure the best performance results from your engine, make sure it is equipped with the proper type of Champion. Every Champion dealer has a chart which will show which Champion should be installed in your engine for best results. Remember it is a genuine economy to install new Champions every 10,000 miles.

**CHAMPION**  
SPARK PLUGS

TOLEDO, OHIO WINDSOR, ONTARIO





**PAINT with ELECTRICITY**  
*The New and Easy Way*

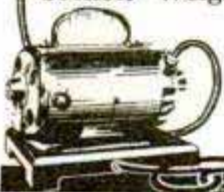
**The ATOMISTER**  
THE EVEN PRESSURE SPRAYING MACHINE

Model "B"  
Air Compressor and Spray Gun complete **\$39.50**

Cut your painting time in half—do a better job—with this handy, convenient spraying machine. Sprays paint, lacquer, enamel, bronze, varnish, stain, shellac, whitewash, insecticides, disinfectants. For use in the home, factory, garage, dairy farm, sign shop, boat yard, truck fleet, gas station, greenhouse, etc. Plugs into any light socket. Weighs 6½ lbs. Air pressure 25-30 lbs. Material container 1 qt.

At your dealer's—or from us **\$39.50**. Write for booklet.

**The Atomister Corporation**  
32 Hamilton Street, Rahway, N. J.



**One Year To Pay**

**No Red Tape 10 Days Trial**

**No. 290—\$60**  
**\$5 Deposit—\$1 a Week**

A magnificent cluster of 7, fine quality, full cut, sparkling, blue-white, genuine diamonds is set in a solid platinum disk. Disk is set in an exceptionally popular, beautifully hand engraved, 18 Kt. solid white gold mounting. This gorgeous cluster has every appearance of a \$600 solitaire.

**18 KARAT**

**SEND NO MONEY** When you get the ring, pay only \$5.00 to the postman. If you keep it, pay only \$1.00 a week for one whole year. All credit dealings kept strictly confidential—No credit orders accepted from persons under 20 years of age.

We are an old **Money Back** firm of diamond importers. **GUARANTEE** You take no risk. If you are not satisfied that the ring is the biggest bargain you ever got, return it and we will refund every cent that you paid.

**PRICE CUT TO \$60.00—WORTH \$100.00**

You can now buy this gorgeous ring at the wholesale price. Compare it with similar rings at \$100. We guarantee it to stand any test or comparison. Greatest bargain offered by any Diamond Importer. We allow 8% annual increase in exchange for a larger diamond ring.

**Write for FREE Illustrated Catalog** It brings our large Jewelry Store right into your home. Gives weights, grades and complete description so you can buy diamonds like an expert. Gives you information that other jewelers dare not tell.

Genuine Blue-White Diamonds as low as \$197.00 a Carat.

**AGENTS WANTED—EARN \$100 WEEK.** Write for details.

**STERLING DIAMOND & WATCH CO., INC.**  
DIAMOND IMPORTERS—\$1,000,000 STOCK—ESTABLISHED 1879  
1540 BROADWAY DEPT. 2609 NEW YORK

## A NEW LOW PRICE ON THIS FAMOUS PLIER!

The well-known Cee Tee Co. Plier is now only 25c. It is the same quality tool which formerly sold at 30c. Never before has such a sturdy and substantial plier been offered at this low price. Like all Crescent-Smith and Hemenway Tools, it is guaranteed to give absolute satisfaction or you get your money back. At your hardware dealer.



**Now 25c**  
**CRESCENT TOOL COMPANY**

210 Harrison Street,  
Jamestown, N. Y.

WRENCHES  
PLIERS  
SCREW DRIVERS  
CHISELS

PUNCHES  
AUGER BITS

SNIPS  
HACKSAWS  
NIPPERS  
ELECTRICAL TOOLS



**CRESCENT and Smith & Hemenway TOOLS**

Made under the supervision of and guaranteed by the originators of the Crescent Wrench



### WE PAY CASH

for OLD GOLD, SILVER, PLATINUM JEWELRY, Dental work. Write for information today!  
L. Polcer, 2408 So. Cicero Ave., Cicero, Ill.

## A Real Opportunity

is offered able, experienced men who are ambitious—Men who can sell, organize and direct crews of go-getters in every principal trade city. These men will have good references, know they can make good, and prove their earnestness by making a small initial investment in the product of a sound and highly rated corporation. Product retails at \$15.00, a repeater, nationally advertised, with a proved market and 24 million prospects in U. S. A. Extensive experience has proved it invaluable as a labor saving device, in offices, banks, stores, factories and homes.

Territorial rights will be granted men of managerial calibre who can qualify. It will be a red letter day in their lives. Unusual opportunity is also offered to salesmen to qualify for positions which will pay handsome returns for honest effort, and offers permanence and growth in power and income.

Replies should give full details of personal business history. All letters will be answered. Address G S M, Dept. 2, 173 W. Madison St., Chicago.



## New—Revolutionary! ...World's Most Compact Outboard

**T**HIS new Super Elto motor measures, folded, only 22 inches by 11 inches by 11 inches — weighs only 38 pounds — develops liberal 3 horsepower. Rugged Elto construction throughout. Easiest starting of all outboard motors. Famous Elto Battery ignition.

### It Folds!

Just a few turns on a single nut unlocks sturdy hinge (patent applied for) on shaft housing—permits lower housing to be snapped back under muffler — instantly — as simple as closing a pocket knife. Write for details on this and other Super Elto models. Elto Outboard Motor Co., Mason St., Dept. AA, Milwaukee.



## Super Elto<sup>®</sup> Lightweight



## "Keep in Tune" with Your Boys

Help develop the musical talent of your boys—it becomes doubly interesting and much easier when Dad goes along with them. You will never regret the little time spent now in helping your boys master a

# BUESCHER

### True-Tone Saxophone

Of all musical instruments, the Saxophone is the one that most appeals to a boy. You'll be surprised how rapidly they master the Buescher—the Saxophone used by the great professionals and record-makers. Playing a Saxophone is a great social asset—besides makes extra earnings possible. Many a boy plays his way through college.

**6 DAYS' TRIAL** on any Buescher Saxophone, Cornet, Trumpet, Trombone or other instrument. Send for free literature—mentioning instrument in which you are interested. (523)

**Buescher Band Instrument Co.**  
2760 Buescher Block Elkhart, Indiana

## It Isn't Static!

*—all that crackling, roaring  
and buzzing in your radio!*

Most of it is caused by oil-burners, flashing signs, electric refrigerators, farm lighting plants, pumps, ventilators, elevators, household appliances, etc., and **CAN BE STOPPED!**



Filterettes silence radio noises caused by these and similar electrical apparatus.



Junior Model  
for small motors

**\$3.50**

Uses no current. Quickly installed. Requires no attention. Eleven types, \$3.50 to \$65.00. Wire for copy of our monthly house organ, devoted to interference problems and their solution, and Filterette Bulletin PM-12 which describes entire line of TOBE FILTERETTES.

**SERVICE MEN:** Why not become your neighborhood specialist in solving "man-made" static troubles? You will not only aid a good cause, but you will greatly increase your business. Write for our proposition to service men.

## Tobe Deutschmann Corporation

CANTON, MASS.

*Pioneers in Eliminating Interference  
Problems of Every Description*





## LUMINOUS PAINT

**Make Your Watches, Clocks, Etc., Visible by Night**

The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, emits rays of white light, rendering it perfectly visible in the dark. **THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES.** Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Crosses, Luminous Rosaries, etc. Small bottle, price 25c. Larger sizes, 50c and \$1 postpaid. **JOHNSON SMITH & CO., Dept. 836 RACINE, WIS.**



### CIGARETTE MAKER

Roll your own and save money. Better and quicker; saves more than half. Use your favorite brand of tobacco. Neat, useful, handy. Pocket size, weighs 1/2 oz. Made entirely of metal, nickel plated. 25c, 3 for 65c postpaid anywhere.



### GOOD LUCK RING

Very striking, quaint and uncommon. Silver finish; skull and crossbones design. Two brilliant, flashing gems sparkle out of the eyes. Said to bring good luck. Only 25c p.p.d.



### Exploding Cigarettes

JUST LIKE ORDINARY CIGARETTES. BUT SUCH REAL STARTLERS! The box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about one-third smoked, the victim gets a very great surprise as it goes off with a loud BANG! A great mirth provoker yet entirely harmless. Price 25c box.

### NOVELTY BADGES



**Kissing Permit 10c** Two very novel metal badges, nickel plated, that you can wear, giving you fun out of all proportion to their trifling cost. 10c, each badge, 3 for 25c, or 75c per doz. postpaid anywhere.



**Garter Inspector 10c** Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for \$1.35, 100 for \$7.50. Also obtainable in Leather Binding, with gold edges. Price 50c each, 3 for \$1.25, \$4.50 per doz. Magnifying Glass for use with Midget Bible 15c.

### MIDGET BIBLE

**GREAT CURIOSITY** Smallest Bible in the World. Size of a postage stamp. 200 Pages. Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for \$1.35, 100 for \$7.50. Also obtainable in Leather Binding, with gold edges. Price 50c each, 3 for \$1.25, \$4.50 per doz. Magnifying Glass for use with Midget Bible 15c.



### STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. Prices, postpaid: 40 Bills 20c, 120 for 50c, or \$3.50 thousand postpaid.

### MAGIC NOSE FLUTE

The Magic Nose Flute, or Hummatone, is a unique and novel musical instrument that is played with nose and mouth combined. There is just a little knack in playing it which, when once acquired after a little practice, will enable you to produce very sweet music that somewhat resembles a flute. There is no fingering, and once you have mastered it you can play all kinds of music with facility and ease. When played as an accompaniment to a piano or any other musical instrument, the effect is as charming as it is surprising.

Post Paid 10c

### SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

### INVISIBLE INK

The most confidential messages can be written with this ink, for the writing makes no mark. Cannot be seen unless you know the secret. Invaluable for many reasons. Keep your postal and other private memoranda away from prying eyes. Great fun for playing practical jokes.

Only 15c a Bottle; 3 for 40c. **JOHNSON SMITH & CO., Dept. 836 RACINE, WIS.**

### Wonderful X-Ray Tube

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the interior opening in a pipe stem, and many other similar illusions. A revelation that no one has been able to satisfactorily explain. Price 10c, 3 for 25c, 1 dozen 75c. **JOHNSON SMITH & CO.**

### NOSE BLOWER

When some men blow their noses it sounds like a trombone. Now the **NOSE BLOWER** has come to torment us. It is a starter! It is ingeniously concealed in the handkerchief. Proceed to blow your nose and your friends will think they heard a steam engine or something. You can blame the hideous noise to your having a very bad cold and keep up the fun as long as you like. PRICE 10c, 3 for 25c, or 75c doz. postpaid.

### Serpent's Eggs

Box contains 12 eggs. When lit with a match, each one gradually hatches itself into a snake several feet long, which curls and twists about in a most life-like manner. Price per box, 10c postpaid, 3 for 25c.

## BLANK CARTRIDGE PISTOL

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## LOOK 35¢ LOOK Wonderful Instrument.

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It is made in the shape of and looks like a regular Automatic Pistol. No one is likely to stop and ask you whether it is real or not. Thus it is likely to prove itself very handy in an emergency. On pressing the trigger it opens up, as shown in the illustration at the right, revealing nine most useful articles—Opera and Field Glass, Telescope, Mirror, Magnifying Glass and Burning Lens, Reading Glass, Sun Dial, Sun Compass, etc. In the handle of the revolver there is a place for various pocket necessities, such as First Aid Articles, Buttons, Pins, etc. The Pistol is of sheet metal, blood finish, that can be carried comfortably in pocket. **PRICE \$1.00 postpaid.**

**PISTOL, OPERA AND FIELD GLASS**  
In One

Exact reproduction of a real pistol; actually fires **REAL BLANK CARTRIDGES** of miniature size. Illustration is actual size. 1 1/4 inches long, with ring at end for attaching to watch chain.

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Loads like a regular pistol. Pull the trigger and it goes off with a loud bang. Pistol is break open type; illustration shows position for loading. Made entirely of high grade steel, nickel plated, octagon barrel, handsomely engraved handles, complete in box with cleaning rod. **PRICE \$1.75.** Also furnished with **pearl handles, \$2.50. BLANK CARTRIDGES, 50c per box of 25.** **JOHNSON SMITH & CO., DEPT. 836, RACINE, WIS.**

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You can easily make a highly sensitive detector-phone by using this Transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention in micro-phones. You can mount the button almost anywhere—card board boxes, stove pipes, still calendars, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitter; often makes an old line "talk up" when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifier radio signals. Countless other similar uses will suggest themselves. Experimenters find the button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to reproduce speech without sound waves. **PRICE \$1.00.** **JOHNSON SMITH & CO., DEPT. 836, RACINE, WIS.**

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Into a trunk, under the bed, under a table, back of the door, into a desk at school, or anywhere. You get lots of fun fooling the teacher, policemen, peddlers, and surprise and fool all your friends besides.

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25 Cents



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A REAL STARTLER. This is the most popular of all squirt tricks. The flower in your coat looks so fresh and sweet that everyone is tempted to inhale the delightful perfume. Then is the moment to press the bulb. Geewhills! Don't they jump? There is a very long rubber tube that easily reaches to the pocket of your coat or trousers, and the bulb is large enough to make a dozen shots with one loading. PRICE 25c each, or 3 for 65c postpaid.

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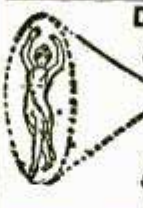
It is great fun mystifying your friends. Get this Conjuror's Cabinet, and you will be the cleverest fellow in your district. It contains the apparatus for ten first-class tricks, including the MAGIC BALL AND VASE TRICK (a wooden ball is placed inside, and upon replacing the lid has disappeared and is found in someone else's pocket); the HINDOO TRICK CARDS (can be made to change completely no less than five times); DISAPPEARING COIN BOX (a coin, placed in the wooden box, vanishes entirely or changes into a coin of another denomination); the GLASS GOBLET TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else); the RIBBON FACTORY FROM THE MOUTH TRICK (a seemingly endless supply of colored paper ribbons comes out of your mouth); the DISAPPEARING HANDKERCHIEF (a handkerchief held in the hand mysteriously vanishes); the WIZARD'S RING COIN TRICK; the ENCHANTED BOTTLE (an one but yourself is able to make it lay down); the GREAT HAT AND DICE TRICK (a large dice is placed on top of a hat, disappears, and is found underneath yet no one has touched the hat); and last, but not least, the GREAT PHANTOM CARD TRICK, or two from five leaves nothing. Full instructions are sent for performing each trick. In addition to the above, a number of other tests and illusions are fully explained for which you can easily make or procure the necessary apparatus. Price complete \$1.00 postpaid. JOHNSON SMITH & CO.



## RESURRECTION PLANT



Great curiosity. Place in water, plant opens up and starts to grow in few minutes. Taken out it dries up and goes to sleep until put in water again. PRICE 10c, 3 for 25c, 75c dozen, postpaid.



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50c You may have a lot of fun with this little peep-show. A regular starliner. Made entirely of metal, having a microscopic lens fitted into one end. While the victim is absorbed in admiration of the pretty picture, and turns the button in the confident expectation of seeing something interesting, a spring syringe is brought into action, and the observer experiences a very great surprise. 50c p. pd. Johnson Smith & Co., Dept. 836, Racine, Wis.

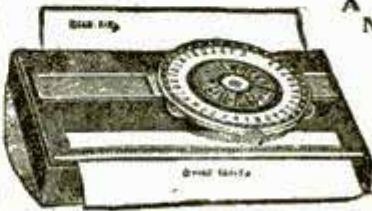


Comical Motto Rings

Lots of harmless fun and amusement wearing these rings. Made in platinumoid finish (to resemble platinum), with wording on enameloid, as illustrated. Price only 25c Postpaid.

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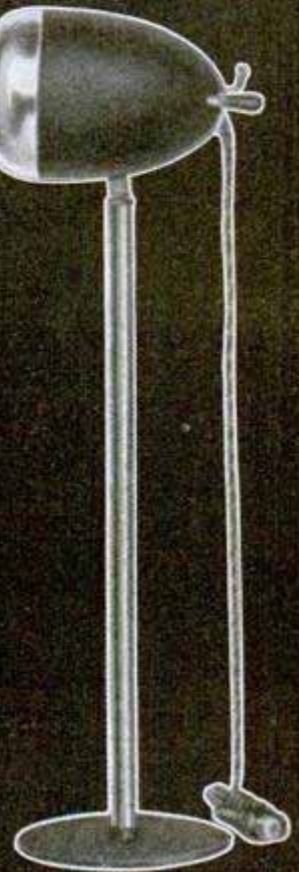
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The Trippe Sunshine Arc is the most advanced type of carbon arc construction—splendidly efficient, well made, simple, and one of the best looking of all Carbon Arc Lamps. It stands in marked contrast of graceful design, portability, compactness against the cumbersome lamps now in the market. It is far lower in price and we guarantee its effectiveness to equal any lamp up to \$300.

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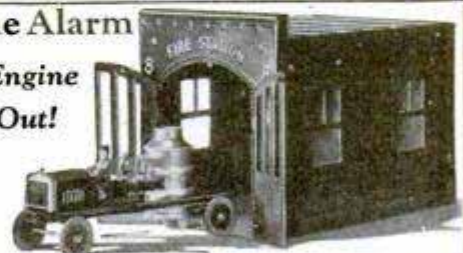
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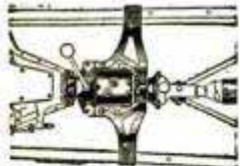
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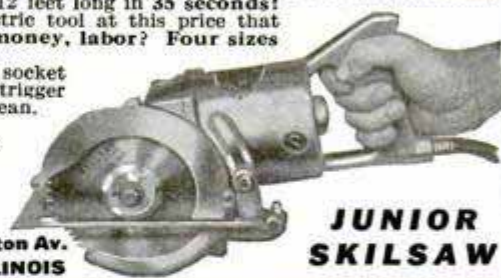
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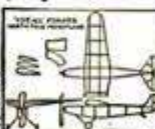
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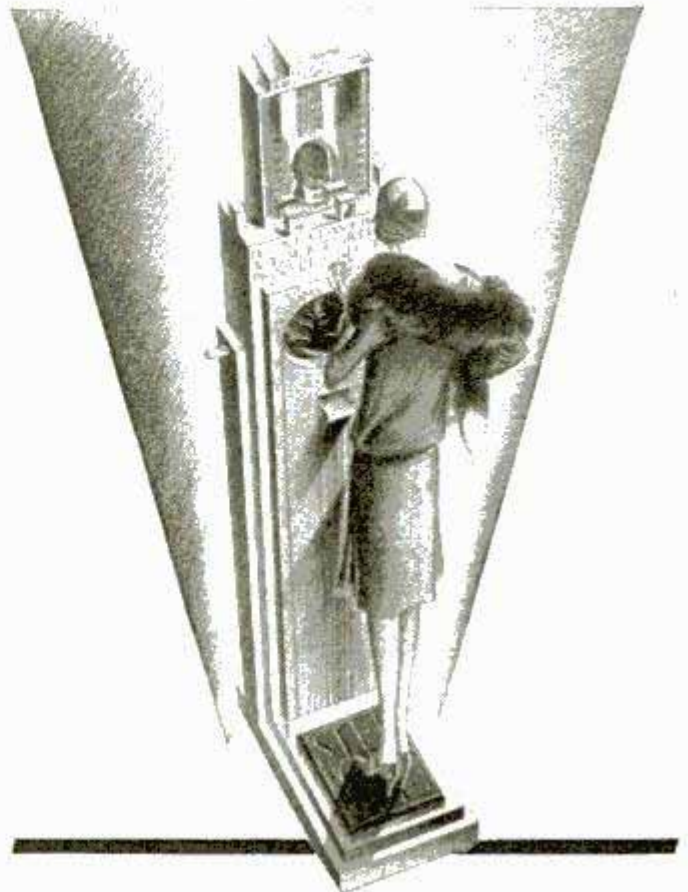
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The steel is the finest in the world. It comes in long gleaming ribbons, and we test every ribbon with crucible and micrometer be-

fore we even pay the import duty.

During the last ten years Gillette has spent millions of dollars on steady blade improvements alone. Four out of every nine Gillette employees are inspectors and do nothing else. They get double pay for every blade they discard. They make certain that every package of Gillette Blades contains its full quota of smooth, comfortable shaves for you.

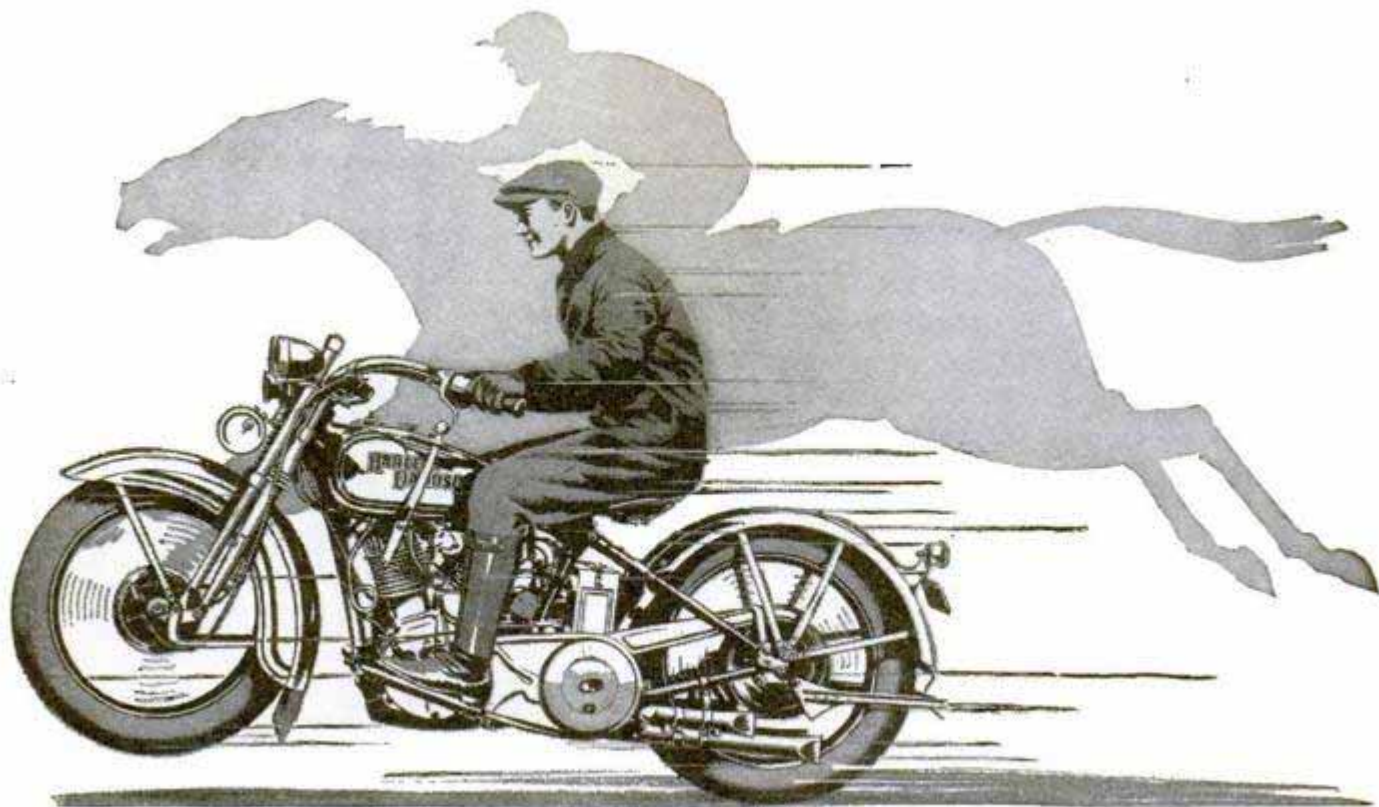
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To be sure of a smooth, comfortable shave under any conditions, slip a fresh Gillette Blade in your razor.

# Gillette







## *Thrilling to Ride as a Thoroughbred*

THERE is a zip and dash to motorcycle performance that is unmatched by anything else on wheels.

Harley-Davidson's eager speed on straightaways, its lightning acceleration, its smooth, quiet rush uphill are the joy of the seasoned rider and the amazement of the novice.

Shown above is the latest Harley-Davidson Big Twin — a wonderfully efficient, powerful, speedy motorcycle that gives sparkling performance at very low cost. Harley-Davidson Twins are priced from \$290 up, f.o.b. factory—Singles at \$235 and \$255.

*Ask your nearest Harley-Davidson Dealer about his Pay-As-You-Ride plan. Mail the Coupon for illustrated literature.*

# **HARLEY-DAVIDSON**

## *Motorcycles*

HARLEY-DAVIDSON MOTOR CO., Dept. P., Milwaukee, Wis.  
Interested in your motorcycles. Send me free illustrated literature.

Name.....

Address.....





Grind it as you find it.  
Mower slips into machine  
without being dismantled.



**This Man**  
*is making*  
**\$4.00 to \$6.00**  
*an hour*  
**with the IDEAL  
LAWN MOWER  
SHARPENER**  
*-Why don't You?*

### Extra Money in Your Spare Time

The Ideal Lawnmower Sharpener will make every hour of your spare time or time when your work is slack, worth from \$4.00 to \$6.00 to you.

**Profitable?** Just ask C. S. Co-burn of Little Rock, Ark. In 18 months the Ideal Sharpener not only paid for itself but earned enough money to buy \$1875.00 worth of new machinery he wanted for his shop—and he worked only during his spare time.

### Put it in Your Basement

or Shop or Garage or even in your yard. The Ideal Sharpener takes up no more room than an ordinary sewing machine and can easily be put in some corner where it will be out of the way when not in use. Many owners mount their Ideal Sharpeners on trucks and travel with them.

### Ready to Go to Work

You don't have to be a mechanic to operate the Ideal Sharpener. It's all ready to go to work as soon as you get it. Set the mower in the machine, make a few simple adjustments, plug into your light socket and start grinding. You don't even have to dismantle the mower.

### \$1.50 to \$2.00 in Fifteen Minutes

You can finish sharpening a mower in 15 or 20 minutes, grinding every blade to razor-like edge, with the accuracy of a lathe. And every mower sharpened earns you \$1.50 to \$2.00, depending upon the charge you fix.

### Earns All Year Round

When lawnmowers are out of season the Skate Sharpening and Grinding Attachments enable you to earn extra money all year round. It handles all kinds of skates, including hockey skates with shoes attached, grass and hedge shears, axes, sickles, scythes, and other edged tools.

**Uses Little Power** May be operated with  $\frac{3}{4}$  H. P. Motor from light socket, or run direct from line shaft.

### An Independent Business From a Side Line

Walter Wever of Middletown, N. Y., built up an independent business working in spare time alone and earned over \$4000.00 in 4 months time with his Ideal Sharpener. He says, "I now have the largest business of its kind around here. People send mowers from 25 to 30 miles to my shop to be sharpened with the Ideal Sharpener. I have made over \$4000.00 in 4 months time." Not bad for a side line and you have the same chance as Mr. Wever.

### Work For Yourself

Be your own boss. A few hours of your spare time in the evenings, with the Ideal Sharpener will soon put you on the road to independence. Our Free Book, "Let George Say It," will help you get started just as it helped C. W. Bowdish, of Lyons Falls, N. Y., to earn \$60.50 in a single month during his spare time; or W. F. Kendt, Buffalo, N. Y., who earned \$2100.00 in a single season, with his Ideal Sharpener, in his spare time. Send for this book now and get started early.

### You Don't Have To Wait

You'll earn from the very start with the Ideal. No town is too small. There are hundreds of mowers in every community waiting to be sharpened and every mower sharpened with the Ideal will bring more business to you. J. C. Keenan, Norwood, Mass., writes, "My friends have advertised the Ideal so much that I have my hands full of work and am still going strong. I have yet to have a dissatisfied customer." You can get into this same paying business just as soon as you get your Ideal Sharpener.

### Pays For Itself

The Ideal Sharpener will pay for itself before you know it and will put extra money in your pocket from the very start. T. S. Huffman, Severy, Kans., says, "I received my Ideal Sharpener two weeks ago and have paid for it already." Chas. P. Bloom, Morrisville, Pa., says, "My Ideal Sharpener has paid for itself already. In the first two weeks I sharpened over 60 mowers and more business is coming in every day." Geo. Kearney, Stillwater, Minn., sharpened 102 mowers in the first two weeks after he got his Ideal. You have the same chance as these and hundreds of other men, who are earning from \$4 to \$6 an hour with this remarkable Lawnmower Sharpener. The sooner you get started the more money you will earn. Mail the coupon today that will put you on the road to independence.

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Dept. K

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SPARE HOUR PAY  
YOU \$4.00 to \$6.00**





## JAPANESE ROSE BUSHES

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Japanese Rose Bushes bloom all the year round. Just think of it. Six weeks after planting the seed, the plants will be in full bloom. It may not seem possible, but we positively guarantee it to be so. They will bloom every ten weeks, Summer or Winter, and when three years old the bush will be a mass of roses, bearing from five hundred to a thousand roses on each bush. The flowers are in three shades—white, pink, and crimson. The plants will do well both in and out doors. We guarantee at least three bushes to grow from each packet of seed. Price, 10c packet, 3 pkts. for 25c postpaid.

### Chinese Fragrant Tree Fern



Just introduced; noted for its rapid growth. An exceptionally pretty ornamental plant. Foliage is rich dark green. Forms grand pyramidal bushes about 6 feet high. Branches very desirable for decorative purposes, wreaths, etc. Seeds 15c pkt., 3 for 40c.

### Weather Plant



NATURE'S WEATHER PROPHECY By mysterious changes that take place, this remarkable plant accurately forecasts the weather many hours in advance. Will grow anywhere all the year around. An interesting house plant. Bears large, fragrant, pink, butterfly shape flowers. Seeds, 15c packet, 3 for 40c, postpaid.

## GROUND ALMONDS

Amazingly Prolific—Easily Grown From Seed The Ground Almond has a flavor that is MOST EXCELLENT, resembling the coconut. The meat is snow white, covered with a shell or skin of brown color. It grows close to the surface and anything from 200 to 300 Almonds may be expected from a single nut. There is no trouble whatever in growing anywhere and in any kind of soil. May be planted any time, and in eight or ten weeks from time of planting you will have an ENORMOUS CROP of the MOST DELICIOUS ALMONDS YOU EVER TASTED. Seeds 15c Pkt.



### Perfume Plant

Blooms only at night, giving forth the most delightful scented fragrance for quite a distance. Causes much comment. For house or garden. Also valuable because of rare perfume made from it. SEEDS, 10c pkt., 3 for 25c.

### Calabash or Pipe Gourds

A luxuriant and rapid growing climber; thrives anywhere. Produces the ornamental gourds from which the famous African calabash pipes are made. Grow this interesting vine and make your own. Seeds, with instructions, 15c pkt., 3 for 40c.

## Mammoth Peanuts

Peanuts can be easily cultivated. Their culture is very simple and exceedingly interesting. Mammoth Peanuts grow to an astonishing size. It is a good producer, very prolific, and the giant nuts have a thick, heavily ribbed protecting shell. The plant is very attractive, the leaves being of odd shape and a handsome green shade, tinted through the center with white. You will derive much pleasure cultivating this interesting species. Seeds 15c pkt., 3 pkts. for 40c.

### Musk Plant

A universally admired favorite for house, flower garden or greenhouse. A very fine house plant. Lives for years. Is of the sweet scented variety, giving forth much fragrance. Also valuable on account of the perfume that can be made from it. Seeds 15c pkt., 3 for 40c.



### Japanese Climbing Cucumber

Unusually strong and vigorous growing vine. Attains twice the size of ordinary varieties. Grows readily on trellises, etc. One hill will keep an entire family supplied all summer. Seeds 15c packet, 3 for 40c, postpaid.



### GIGANTIC BUTTER BEANS

THE NW EDIBLE VEGETABLE WONDER Grows to an astonishing size, the Beans measuring from 3 to 6 feet long, and weighing anything from 10 to 16 lbs. and even more. One Bean is sufficient for a family for several meals. Very palatable and rich in nutritious materials. The delicate Buttery Flavor is much appreciated. The Vines are easily grown, very prolific, and a most welcome and valuable adjunct to your garden. Try them; you will find them the most delicious vegetable you have ever tasted. Imported direct. Unobtainable elsewhere. Sample package of Seeds with full directions for cultivating and cooking. 25c, postpaid.

### Kudzu Vine

Most rapid growing vine known. Will grow 20 feet in one week. Luxuriant foliage, lovely purple flowers, very fragrant. Nothing to equal it for shade purposes and quick growth. Seeds 15c packet, 3 for 40c.



### Yard Long Bean

Produces enormous crop of long, slender, round pods, of excellent quality for snap beans. Pods grow from 2 to 5 feet in length. Very tender and fine flavor. The vines are rampant growers; an interesting curiosity. Seeds 15c pkt., 3 for 40c.



## THE REMARKABLE FIREFLY PLANT



A Vine that Blooms at Night Fills the Atmosphere with Fragrant Aroma One of the most rapid growing vines known. Under favorable conditions this vine has been known to grow OVER 25 FEET IN A SINGLE WEEK. In a very short space of time indeed the Vine has climbed to a great height, and is covered with IMMENSE FLOWERS, from 5 to 7 inches in diameter. It is, indeed, a great novelty, for, unlike other plants, the flowers OPEN IN THE EVENING, and remain open until about noon the following day. In dull weather they will remain open all day. It is a most INTERESTING SIGHT to watch the opening and closing of the flowers as the clouds appear and disperse. As the flowers open they give forth the most DELIGHTFUL AROMA and the whole atmosphere around is full of scented fragrance. It is always the object of favorable comment, and much curiosity is aroused by people passing at night time as to the cause of the charming aromas, frequently stopping in an endeavor to satisfy their curiosity. PRICE, 19 CENTS packet, two packets for 35 CENTS, POSTPAID. JOHNSON SMITH & CO.

### The Great Wonderberry



A luscious berry that may be grown and ripened from seed in any soil or climate in 3 months. The flavor is fine and unsurpassed for eating raw, cooked, canned or preserved in any form. The fruit is blue-black in color, and tastes like a luscious rich blueberry. One bush will produce an enormous amount of fruit, yielding great masses of rich fruit all Summer and Fall. Packet, 10c, 3 pkts. for 25c, postpaid.

### Bush Musk Melon



A vineless Musk Melon, grows in bushes, and thus can be cultivated in the smallest garden. The fruit is of the popular "Jenny Lind" type, but larger, averaging 5 inches in diameter. The flesh is very deep, edible almost to the rind and is colored light green, flushed with a tinge of pink in the center. The quality is superb, lusciously sweet and juicy. Packet of seeds, with full directions for culture, 15 cents, 3 packets for 40 cents, p.p.d.

### The Great Japanese Umbrella Palm

Easily Grown From Seed Winter or Summer The Japanese Umbrella Palm is a semi-aquatic plant. It is easily grown from seed either in a bowl of water or in very damp soil. Probably the most usual, as well as the most interesting method, is to cultivate the plant in a bowl or jardiniere filled with water, with two or three inches of good garden soil at the bottom. The seeds soon commence to germinate, and the plant shoots up stems two to three feet high and rapidly assumes a most pretty palm-like appearance, as shown in the engraving. The tops of the stems are surmounted by a whorl of umbrella-shaped leaves, of a waxy appearance. We will send a package of this seed, with full instructions for culture, for only 15c or three packets for 40c postpaid.

### Butterfly's Own Bush



This plant is a veritable refuge or haven for butterflies, and it attracts all the most beautiful types of butterflies to the neighborhood. Bees, too, are very fond of it. It is a pretty plant bearing perfectly double flowers, ranging from white to rich crimson, deep red and pink, lilac and other delicate shades. Packet 10 cents, 3 for 25 cents postpaid.

### CROWN OF THORNS



A very curious clover-like plant, can be cultivated indoors or outdoors, the three red blotches on the leaves representing the three wounds of Christ. Has curious thorny seed ball; if loosened at the hull is found to consist of a long prickly-edged band wound spirally around the seed cluster, giving the plant its name. Seeds 15c packet, 3 for 40c.

### "Wong-Bok" Chinese Cabbage

Novelty from China and should be grown in every garden. Seems to be a cross between Celery and Cos Lettuce. Flavor is more mild than any other cabbage. Can be served on the table and eaten raw or cooked like cabbage, spinach or lettuce or made into salad. Grows very rapidly, easy to cultivate. You can create quite a sensation by cultivating this remarkable novelty. Seeds, 15c packet, 3 pkts. for 40c.

### FAMOUS MEXICAN FIREFLY PLANT



Beautiful hedge plant, grows 2 to 2 1/2 feet high and resembling a closely clipped ornamental evergreen. The globe-shaped or pyramidal bushes are close and compact, and of a pleasing light green color. May be grown singly or in the form of a hedge or background. In early autumn the whole bush becomes crimson or blood red, hence the name of Mexican Fire Plant, or "Burning Bush," as it is sometimes called. Selected Seeds, 10c

### Asparagus Sprengeri



The best plant for hanging baskets. Masses of rich, gleaming foliage droop in a very graceful manner. The foliage when cut for decorative purposes will last for weeks in water. The seed pods are very pretty red berries adding to its beauty. Packet, 25c, 3 pkts. for 65c postpaid.

### TREE OF HEAVEN

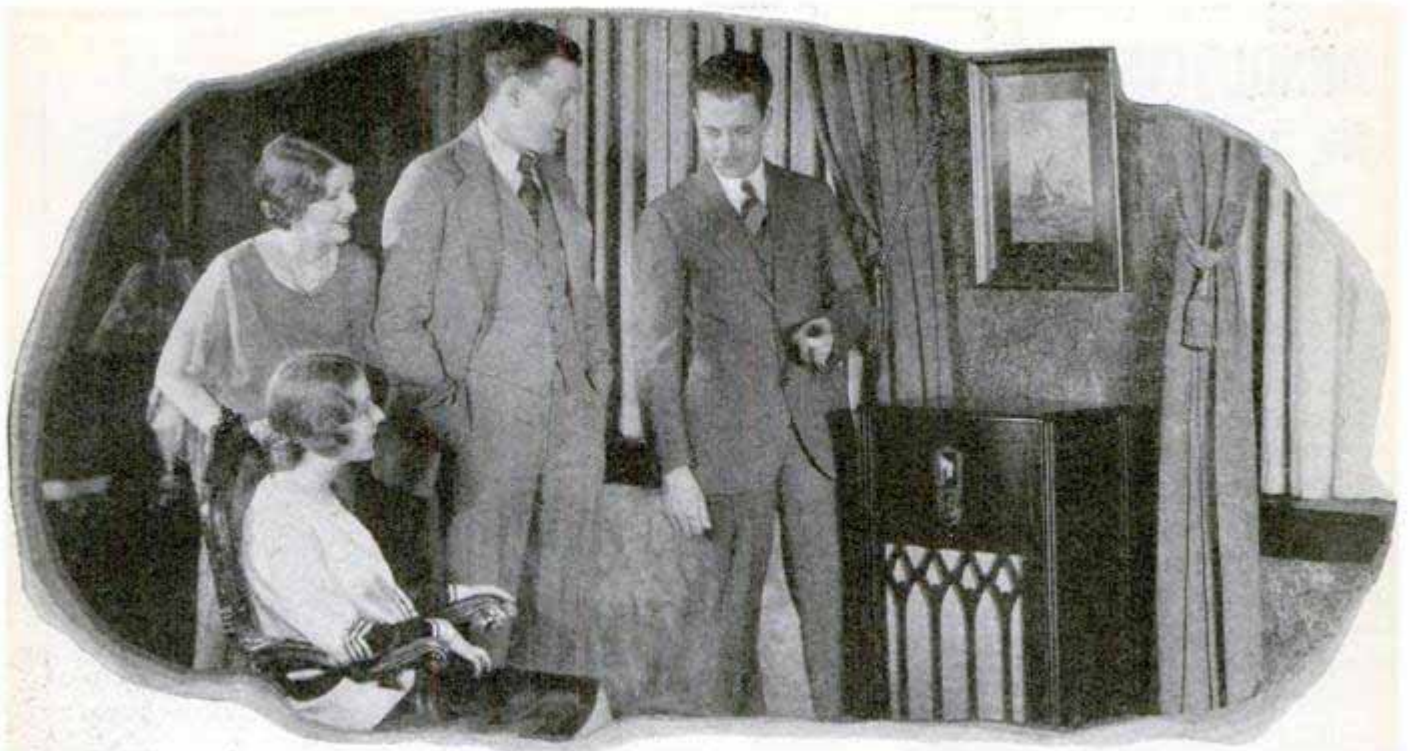


This splendid ornamental tree is a native of China, and is called the Tree of Heaven, on account of its great beauty. Very hardy, thrives in any soil, no matter how poor, and grows from 6 to 10 feet high from seed the first summer. The leaves are from 5 to 6 feet in any length, giving it a grand appearance. Not only outside the tropics can it rival it for lawn decoration. Large panicles of bloom, followed in season by great clusters of colored seed pods, make the tree a continual thing of beauty. Packet, 15c; 3 packets 40c.

### SURPRISE FLOWER GARDEN

Over Hundred Varieties of Mixed Flower Seeds MANY RARE AND CURIOUS NOVELTIES An Abundance of Flowers Assured Throughout the Season A mixture of easily grown annuals that bloom very soon after sowing the seed; others vary in their time of blooming. Those who cannot give the constant care necessary for finely arranged flower beds will be delighted with the Surprise Wild Flower Garden. Will prove a continual surprise and pleasure, as new varieties and the old garden favorites flower successively throughout the season. There are over a hundred varieties of seeds. Many of the plants may be taken inside as house plants and will bloom during the winter. Fine for children, also teachers for school gardens. Packet, 15 cents, three packets for 40 cents, postpaid. J. S. & CO.





# They Could Hardly Believe Their Own Ears - when I Switched to *Ground Wave Reception*

"IT'S no use trying to listen in tonight," said Bill as I took his hat. "Jane and I tried to get reception during dinner but all we got was static. It's usually this way—just the night they broadcast Paul Whiteman's band or some other good program it's spoiled by howls and fading."

"Perhaps my set will do a little better," I suggested. I had a surprise in store for him!

He looked doubtful as I turned on the set switch. I had left my old aerial antenna attached on purpose and soon the room was filled with an ear-splitting excuse for music. Manipulation of the dials only served to make it worse. Occasionally it faded out altogether. Then the howls would start up again until my wife finally shouted, "Turn that thing off—it's terrible."

Satisfied, I laughed and disconnecting the old aerial and ground wires I then attached the lead-in wires of my new underground antenna, which I had installed just before dinner. "Now listen!" I commanded.

## The Thrilling Test

As though by magic, the sweet high notes of violins and the stirring sobbing of saxophones brought Bill to his feet! Jane looked dumbfounded. The static was so greatly reduced that we hardly noticed it! We were getting one of the year's best programs with scarcely any trouble on a wild, stormy night.

"You see," I explained later to Bill. "I buried my new underground aerial about two feet below the ground, where wind and storms can't affect it so easily. They call

this thing "Subwave-Aerial" and it's insulated some way to keep out interference and noise. It's combined with a scientific ground so I'm sure now that I have the correct ground connection. All this isn't costing me any more than my old aerial antenna. And I'll never need to touch it again. It's guaranteed for 25 years.

Hardly necessary to say that Bill went home with the name and address of the Subwave-Aerial manufacturers in his pocket.

## Test It Yourself—FREE!

The above story illustrates the results for which the designers of Subwave-Aerial struggled for months. At last, enthusiastic reports such as this from Radio Experts reproduced here, proved that they had succeeded. Now you have a chance to prove the merits of this great new radio development for yourself. Try if possible, to pick a night when static is bad and make the thrilling test. It's fun! And if you are not more than pleased, the test won't cost you a cent. Be sure to send at once for all the interesting details on the development of Subwave-Aerial. Use the coupon NOW!



### SUBWAVE-AERIAL Gets DX Installed 50 Feet From 60,000-Volt Power Line

"On January 27, 1929, drove out near the Sanitary District power plant—stopped about 50 feet distant from 60,000-volt transmission line—dug a small hole, into which we dropped the Subwave-Aerial, attaching the lead-in wires first to a 5-tube Freshman, then to a single-dial Atwater Kent, Model 35.

"We got WCCO, St. Paul, Minn., and Toronto, Can., loud and clear—not the slightest interference from the 60,000-volt power line 50 feet away. It was impossible to get reception with an overhead aerial under the same conditions." Yours truly,

F. Bennett Smith,  
Harry R. Jackson.

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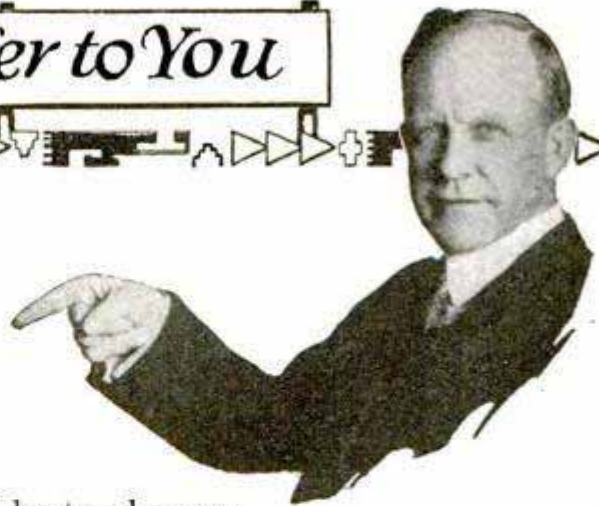
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My sole aim, during the year 1929, shall be to place as many standard, dependable Watches as I can in the hands of men throughout the land REGARDLESS OF PRICE OR PROFIT. To do this I have cut the price to ABSOLUTELY ROCK BOTTOM. I know that if I can distribute 5,000 "Santa Fe Specials" this year on this NO-PROFIT PLAN, that every Watch will be a salesman and sell at least one more. I am making this STARTLING AND UNHEARD OF OFFER to those who will tell their friends of this remarkable Watch value, if they find the Watches all and more than I claim for them.

*Alouzo Thomas*

President, Santa Fe Watch Co.

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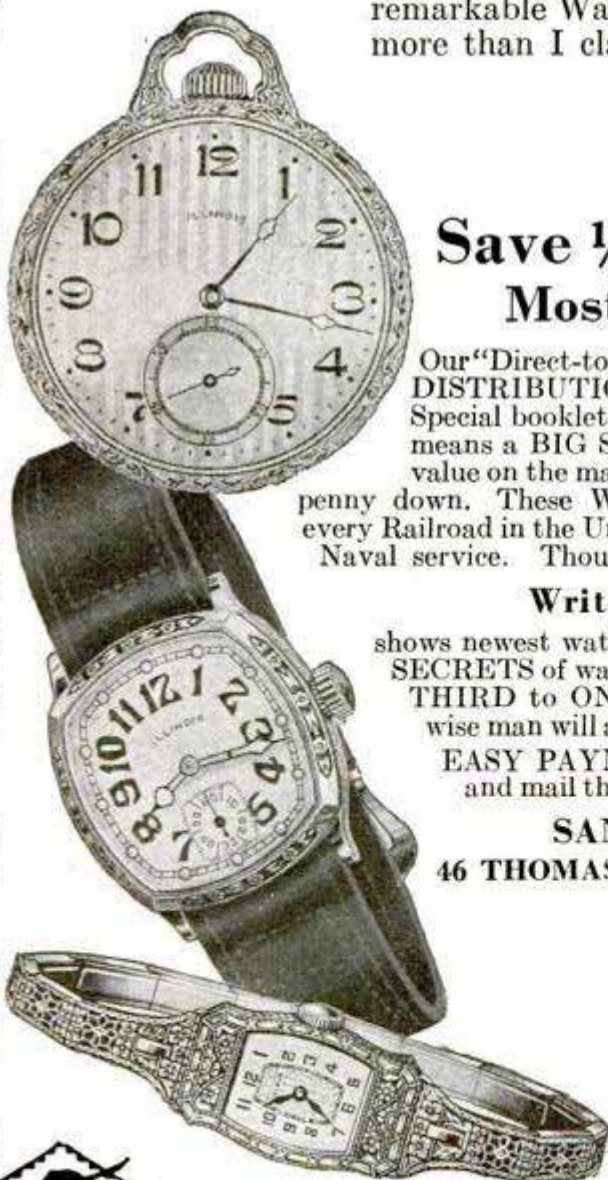
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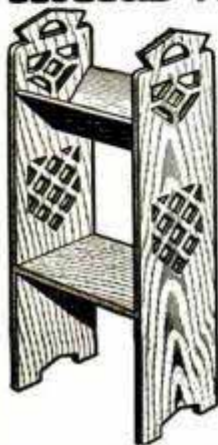
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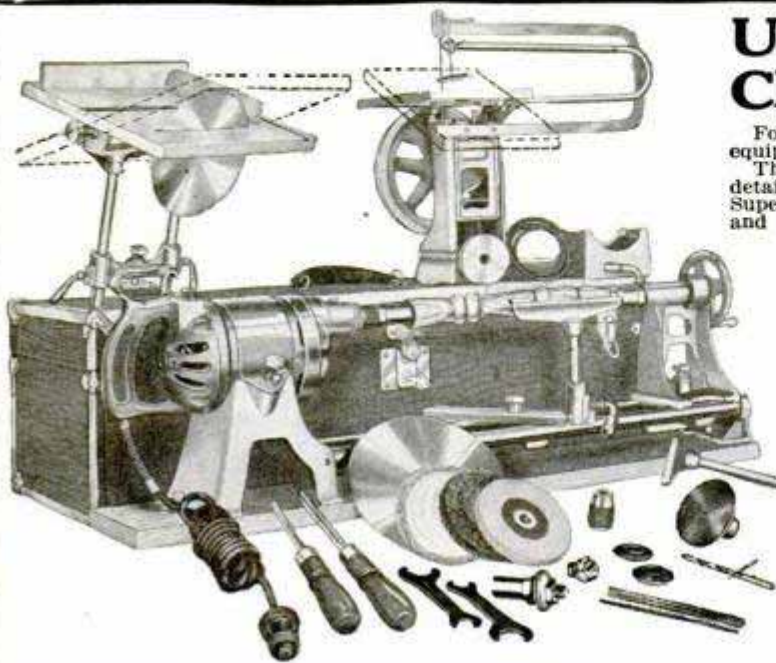
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For the handy man or boy who enjoys working with well equipped electrically driven wood working machinery!

The Up-to-Date Home Craftsman Shop is complete in every detail and is exactly such an equipment. It is driven by a Super-Power 1/2 H. P. Electric Drill. The lathe, circular saw, and jig saw are all well constructed and real wood working

tools. Each purchaser of a Craftsman Shop is given free of charge a 12 month course in Wood Craftsmanship, and 27 well designed blue prints of various pieces of furniture, toys and models.

Full details and illustrations sent without obligation. A 10 day free trial is given. Can be purchased on Monthly Payment Plan—Write to-day!

### 12" Band Saw

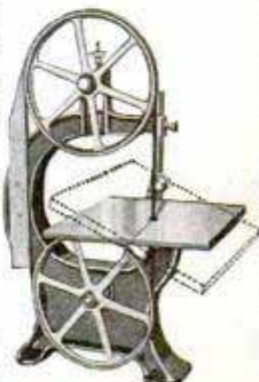
Perfection in design and construction, this wonder working band saw is positively the greatest value ever presented to the home or shop mechanic. Send for details. May be purchased on Time Payment Plan..... \$39.00

**\$35.00**

**F. O. B. Chicago**

**Write NOW!**

To Manager Department No. 32,  
**UP-TO-DATE MACHINE WORKS**  
2915 So. Wabash Ave. Chicago, Ill.





# Guarantee— New Hair grown quickly or no pay—

FREE TRIAL  
mail coupon  
below—NOW



## The amazing story of INFRA-RED RAYS

**N**OW at last—through the electric magic of Infra-red Rays—Science has found a startling way to grow new hair quickly.

No matter how fast your hair is falling out, no matter how much of it is gone—this is our guarantee: This amazing new electrical discovery will end your dandruff, stop falling hair and grow thick, luxuriant new hair in 4 weeks—or you pay nothing! You risk nothing. You are the judge—your own mirror will furnish the astounding evidence.

### Famous Surgeon's Discovery

All observant men have noticed that their beard grows faster in hot weather than in cold. What causes that?

Simply this: Heat rays of a certain kind that stimulate and vitalize the hair-growing tissue.

Two years ago a noted surgeon, seeking to bring back his own hair—applying all his scientific knowledge to the problem—made a remarkable discovery. It is the first time a scientific man of his standing has ever entered this field of helpfulness.

He discovered a simple way in which to use life-giving invisible heat rays—known to all scientists

—to restore health and normal conditions to the scalp tissues and so RESTORE HAIR in all but certain rare instances. It ended his own baldness. Today his hair is unusually thick and luxuriant.

### Called Dermo-Ray

Because of his scientific conservatism and his standing in his profession, the discoverer of Dermo-Ray made no general announcement of his startling discovery. But, as the head of his own hospital, his own case records—with hundreds of men and women—proved scientifically, conclusively, that this new discovery grows hair, when nothing else will—grows hair, ends dandruff, in NINE OUT OF TEN CASES. Now that the amazing power of Infra-red Rays is known to the entire scientific world—and DERMO-RAY has been proved to be one of the most startling scientific discoveries of recent years—now for the first time, has Dr. Theodore H. Larson permitted public announcement of his discovery to be made.

### Infra-red Rays Reach the Roots

In nine out of ten so-called cases of baldness the hair roots are not dead. They are only dormant. But when you try to reach them with hair tonics, oils, massages and salves, you are obviously wasting both time and money. For you treat only the surface skin—never get to the roots.

Your own physician will tell you that the warm, soothing Infra-red Ray penetrates more deeply through human tissue

than any other harmless heat-ray known to science. It reaches the hair root and electrically, almost magically, revitalizes it. Hair literally "sprouts" as a result.

### Send No Money

You can use DERMO-RAY in any home with electricity. The warm, soothing, Infra-red Rays vitalize your scalp while you rest or read—a few minutes each day is all the time required.

In four weeks you will be free forever from the social and business embarrassment of baldness—or you pay nothing.

Complete facts about this astounding new scientific discovery, opinions of authorities, incontrovertible evidence, and details of special trial offer will be sent free, if you mail the coupon below. To forever end your scalp and hair troubles, act at once. Print your name and address plainly—and mail the coupon NOW.



Rough Diagram Suggesting: Left—the long-wave Infra-red Rays; right—short-wave Ultra-Violet.

— — FREE TRIAL OFFER — —

THE LARSON INSTITUTE,  
216 North Wabash Ave., Dept. 440,  
Chicago, Illinois.

Send me at once without obligation, full particulars—in plain envelope—of your 30-day Free Trial of DERMO-RAY.

Name .....

Address .....

City .....

State .....





**No Need to Borrow  
Money When You Can Easily Earn**

**\$150 to \$300 Monthly**

**With Practically No Investment On Your Part**

Your banker will advise installing HB Equipment because it pays for itself without tying up your working capital, brings you big profits from pleasant work, is simple and easy to operate—and comes to you on

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**1. 8-Hour Battery Service** brings hundreds of new customers. Charges batteries in  $\frac{1}{2}$  the time and saves 30% to 50% of electric bills over rectifiers. For more information check No. 1 in coupon below.

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**3. Spray Painting with new HB Portable Paint Spray** does high class work at  $\frac{1}{5}$  the cost of old time brush methods. You get five men's income for one man's labor, painting autos, houses, barns, furniture, etc. For information check No. 3 below.

**4. Business Building Air Service** now available for as low as \$12 monthly for a few months. Brings car owners to your door day and night. Check No. 4 for full details.



You can have the moneymaking advantages of HB Equipment in your shop for as low as

**Only \$12 to \$16 Monthly**

for a few months—just a small part of the extra profits it will bring you. For full information without obligation, check and mail the coupon below.

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Successful manufacturers ~ since 1893 ~

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Send me complete information on the items I've checked with your 30 day trial offer, easy payment terms, and information on how HB equipment will increase my earnings.

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- 2 ☐ Electrical Test Bench Opportunities
- 3 ☐ Portable Paint Spray Business
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NAME.....

ADDRESS.....

## A Steady Income

Start your own Business with this NEW Low-Priced Electric Woodworker.

**7**

**Machines in One**

Circular Saw  
Band Saw  
Lathe  
Jointer  
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Mortiser  
Sander  
Performs 35  
Woodworking  
Operations.



### The Electric Carpenter Runs from any Light Socket

You can earn good profits... in spare time or full time... making screens, storm sash, mouldings, cabinet work, mill work, etc. Performs every woodworking operation with speed and accuracy... Mitering, shaping, mortising, tenoning, paneling, rabbeting, boring, sanding, etc.

**WRITE TODAY** for full details and **LOW PRICE**

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# Silver Ace

*Flying*



*"Instructive and Interesting!"  
says Air Mail Pilot*

Walter J. Addems, who flies the Air Mail day and night on the Chicago-New York run says, "Model flying and construction is very instructive as well as interesting, because the same principles apply as in full-sized ships."

Silver Ace models have flown over 800 feet. Their performance depends on the owner. Boys of ten and twelve have no difficulties securing fine flights. How good are you?

Silver Ace construction sets and supplies are the same high quality as Silver Ace ready-to-fly models. Silver Ace leads in the air.

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**AERO MODEL COMPANY**

Dept. M4, 329 Plymouth Court, Chicago, Illinois





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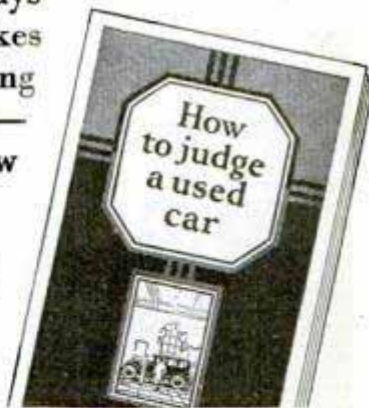
... Then send for this **FREE** book

**L**ET this FREE book, "How To Judge a Used Car," be your insurance against a mistake that may cost you hundreds of dollars!

Two cents brings you trade information compiled from the years of used car buying experience of many acknowledged experts. It brings you 32 interesting pages of text, every paragraph of which holds some valuable hint on used car buying. There are pictures illustrating just what to look for in the used car you want.

How can you tell the model of a used car? What do speedometers show? What do code prices mean? How would you set a fair price on a used car offered by a friend? How do you avoid "orphans"? Why does the Studebaker Pledge give you five days' driving trial? It takes only a 2c stamp to bring you the *right* answers — mail the coupon below *now!*

*130,000 people saved  
money by mailing  
this coupon*



## Pledge to the Public on Used Car Sales

- 1** Every used car is conspicuously marked with its lowest price in plain figures, and that price, just as the price of our new cars, is rigidly maintained.
- 2** All Studebaker automobiles which are sold as **CERTIFIED CARS** have been properly reconditioned, and carry a 30-day guarantee for replacement of defective parts and free service on adjustments.
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Dept. 154, South Bend, Indiana

Please send me copy of "How to Judge a Used Car."

Name.....

Street.....

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# STUDEBAKER

Builder of Champions





## \$2 to \$4 an Hour in Your Own Business



"I have had your Foley Saw Filer since December, 1926, and am well pleased with it. My filing averages \$15 a week in my spare time."

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## FREE Plan Starts You in Spare Time

This is your BIG OPPORTUNITY to get into a FINE PAYING business of your own. Very little capital is necessary, and you have no stock to carry. Many men who started in their spare time, have built up a PERMANENT BUSINESS that pays them BIG MONEY. Paul Bock says, "Your filer is a wonder—have more filing than I can handle."

No experience necessary—you can learn to operate the Foley AUTOMATIC Saw Filer quickly by following the simple instructions. Even 14 year old boys are doing perfect work—you can too.

## NO CANVASSING

The Foley files all kinds of saws—hand saws, band saws and circular saws. You can get all the work you can do from carpenters, contractors, schools, woodworking plants, hardware stores and many other businesses. The Foley files saws so perfectly that they are better than hand filed, and you will make steady customers after you have once filed saws for people.

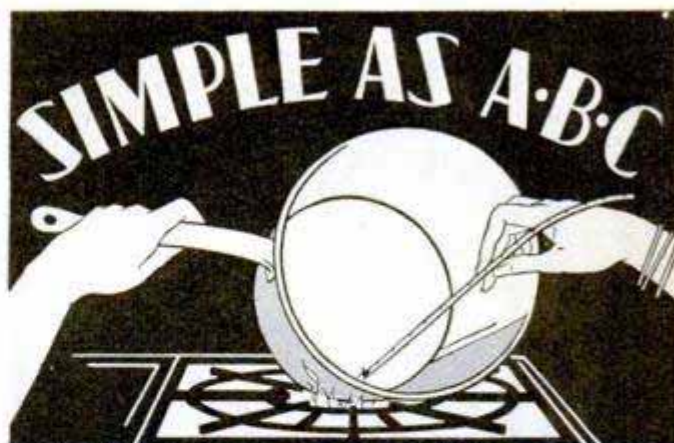
**Mail This Coupon for FREE Plan**

Foley Saw Tool Co., Inc.,  
238 Foley Building, 11 Main St., N. E.,  
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Send me your FREE Plan and tell me how I can make  
BIG MONEY in business for myself with a Foley  
AUTOMATIC Saw Filer.

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It's so easy to solder . . .

*free sample proves it*

Like magic! Kester Metal Mender makes soldering so easy to do. It is a solder with the flux itself right in the core. Only heat is needed. With Kester, you can do a professional job of repairing or making something of metal—in a jiffy. No need to wait for the repair man—do it yourself with easy-to-use Kester Metal Mender. Your hardware, auto accessory, electrical supply, general and other stores sell it in the handy metal tins.

**free!** A sample of Kester Metal Mender will be sent on request. See for yourself how easy it is to solder.



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METAL MENDER**  
*The Household Solder*

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**"Interlox"** Speeds up all measuring. Slides in and out—no folding. Direct-reading for instant inside measurements, as well as outside. Any length, 2 to 8 ft., 20¢ linear ft. If not at dealers, sent postpaid.



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Dealers and Agents: Write for attractive proposition.

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**Belle City**

**Home Electric  
Hair Clipper**

Anyone can trim or bob hair, shorten bangs, clip neck or underarms in a shape almost impossible with hand clippers or shears. Operates on direct and alternating current. Will not clog or cut the skin, and cuts as cleanly as a razor. Thousands in use. Rigidly guaranteed.

**Fits  
Any  
Light  
Socket**

**TEN DAYS' FREE TRIAL**

If your hardware or electrical dealer can't supply you, write for interesting booklet, or order from this ad. Send no money—pay postman \$8.75. Return it in ten days if not satisfactory. State whether 110, 220 or 32 volt current is used.

Dealers and Representatives Wanted

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Bath Room Outfits \$55.75  
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Furnaces  
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# Save 1/2 on Material Save ALL Labor Cost

We Show How You Save Hundreds  
of Dollars Installing Your Own

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6 Room  
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Plant  
\$165.00  
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MAIL the coupon today and get this wonderful, Big FREE Book that lists 4000 great bargain offers and shows every little detail for installing your own plumbing and heating. Nothing like it ever printed before. Everything new, modern and up-to-date. Homes everywhere follow our instructions and save hundreds of dollars. You can do it too!

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If you can use a wrench you can be your own plumber. Our amazing, simple and easy plan explains everything. No experience necessary. We help you in every way possible. Thousands of our customers do their own plumbing and heating work.

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Many offers in our Big Catalog sold on small, easy payments. Goods shipped in 24 hours. We carry largest stock and variety in U. S. covering two solid acres of floor and shelf space.

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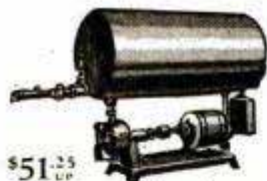
Don't delay! Don't wait another minute to investigate the most successful home savings, plumbing and heating plan ever devised. Mail the coupon—now!

**BURKE (4) BROS., 422 Liberty Ave., Pittsburgh, Pa.**

Largest Stock of  
Accessories, Sup-  
plies and Fittings  
in the U. S. A.



**GET  
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BOOK  
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\$51.25  
UP  
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Water Systems



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Lowest Prices on  
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Steel,  
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Remarkably low prices on  
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- Bathroom Outfits ☐
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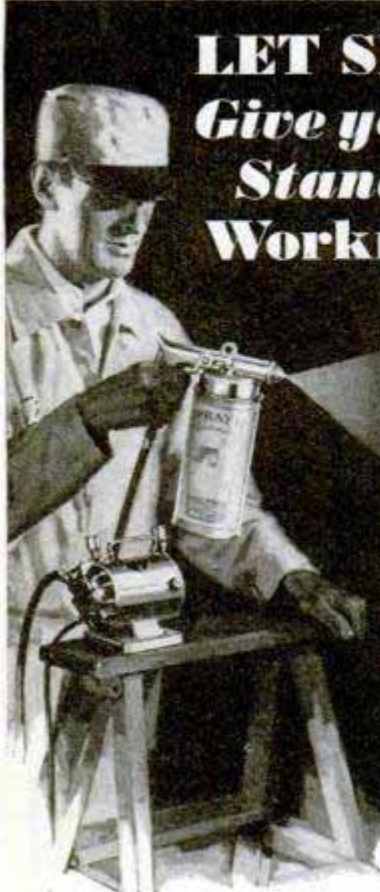
Send your Big FREE Catalog of 4000 Wholesale Bargains explaining how I can install my own plumbing and heating. (Check subjects in which you are specially interested).

Name.....

Address.....

City..... State.....





**LET SPRAYIT**  
*Give you a New  
Standard of  
Workmanship*

**\$39<sup>50</sup>**  
**COMPLETE**  
*with*  
**Compressor Unit**

*Plug Into  
Any Light Socket*

**G**RASP the pistol-grip of the *New Agitator Type ELECTRIC SPRAYIT*—and pull the trigger! No matter what your job is—or the finish that you use—you're proud of the job it helps you do, quality workmanship, truly professional, speedy, economical.

There's reason for the tremendous success of the *New Agitator Type ELECTRIC SPRAYIT*. The "fluid agitation" feature is considered the greatest single improvement in spray painting equipment since its inception.

Plug-in the *New Agitator Type ELECTRIC SPRAYIT* at the nearest light socket—and you're ready to go. The spray, either fan or round shape, starts or stops instantaneously. The pistol-trigger controls it, always at full pressure, in a flash.

Handled by leading jobbers and dealers. If you do not know where to buy the *Agitator Type Electric Sprayit*, use coupon below.

### Rent a Sprayit for Home Use

For any paint job in the home, your dealer can now rent you an *ELECTRIC SPRAYIT* at a nominal daily charge. Write for details of the new *Sprayit Home Rental Plan*.

# SPRAYIT

*Electrically*

REG. U.S. PAT. OFF. 12-20-27

**THE ELECTRIC SPRAYIT CO., Inc.**  
204 E. Colfax Ave., South Bend, Indiana

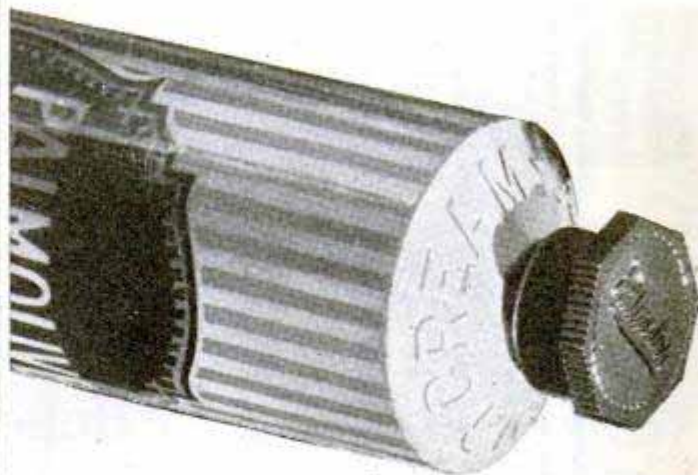
☐ Send me the *New Agitator Type ELECTRIC SPRAYIT* at \$39.50 f. o. b.

☐ Send details of New *Sprayit Home Rental Plan*. ☐ Send complete information only.

Principal use for *ELECTRIC SPRAYIT*

*Write Complete Name and Address Below*

# It's a Gift



**Men, it's yours for the asking.  
Mail the coupon for generous  
7-day sample. It will prove a  
revelation in shaving comfort.**

GENTLEMEN: Our success is based on the approval each morning, of a million men. If we fail to please them, if our quality is relaxed ever so little, we lose friends. And friends, we have found, are our best asset.

We gain these friends by a unique offer. Before we ask you to buy our remarkable shaving cream, we first offer it to you for a week's test free. Men who customarily never mail coupons, send this one in.

And 86% of those who try Palmolive Shaving Cream become staunch supporters for it. They make claims that we would hesitate to print. Their enthusiasm is supreme. Won't you let us send you a sample now that you may have seven delightful shaves at our expense? That will prove our case one way or the other. You be the judge. Just mail the coupon.

### These 5 superiorities

Palmolive Shaving Cream came as the result of years of experiment. 129 formulas were rejected before we embodied all in one preparation, the things 1000 men had said that others failed in.

1. Multiplies itself in lather 250 times.
2. Softens the beard in one minute.
3. Maintains its creamy fullness for ten minutes on the face.
4. Strong bubbles hold the hairs erect for cutting.
5. Fine after-effects due to palm and olive oil content.

Perhaps your present shaving method satisfies, and yet there may be a better way. In fairness to yourself—and to us who undertake to please you in one week—won't you mail the coupon now for the test we offer?

◆◆◆◆◆

**PALMOLIVE RADIO HOUR**—Broadcast every Wednesday night—from 9:30 to 10:30 p. m., eastern time; 8:30 to 9:30 p. m., central time; 7:30 to 8:30 p. m., mountain time; 6:30 to 7:30 p. m., Pacific time—over station WEA and 39 stations associated with The National Broadcasting Co.

To add the final touch to shaving luxury, we have created Palmolive After Shaving Tale—especially for men. Try the sample we are sending free with the tube of Shaving Cream.

4328

## 7 SHAVES FREE

and a can of Palmolive After Shaving Tale

Simply insert your name and address and mail to Dept. B-3040, Palmolive, 595 Fifth Avenue, New York City.

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(Please print your name and address)



# The C-O Master Mechanic

With this new and practical machine, you can handle all jobs of turning, grinding, drilling and repairing in METAL and WOOD. Fast, accurate, sturdy and guaranteed by the makers of the famous C-O Garage Tools and Shop Equipment, known the world over.

Plug into any electric light socket. **EASY TO OPERATE**—Simply swing drill head to the right or left and attach special chuck.

**LATHE**—6" swing, 14" between centers.  $\frac{1}{2}$ " Universal chuck, 3" face plate, center plate, tool post,  $\frac{5}{8}$ " chuck dog, cutting tools, special wrench to fit all nuts and screws. 2 speeds—500 and 1,000 R. P. M.

**DRILL**—Drills holes 0 to  $\frac{3}{8}$ ". Adjustable head with  $7\frac{1}{2}$ " travel on column. Drills to 9" circle and has  $2\frac{1}{2}$ " up and down spindle run. Speed is 1100 and 2200 R. P. M. 3-jaw chuck furnished with  $\frac{1}{8}$ " chuck wrench.  $\frac{3}{4}$ ",  $\frac{1}{2}$ ",  $\frac{3}{8}$ " and  $\frac{1}{4}$ " bits.

**UNDERCUTTER**—Instantly adjustable and does accurate work. Equal to any separate and more expensive undercutter.

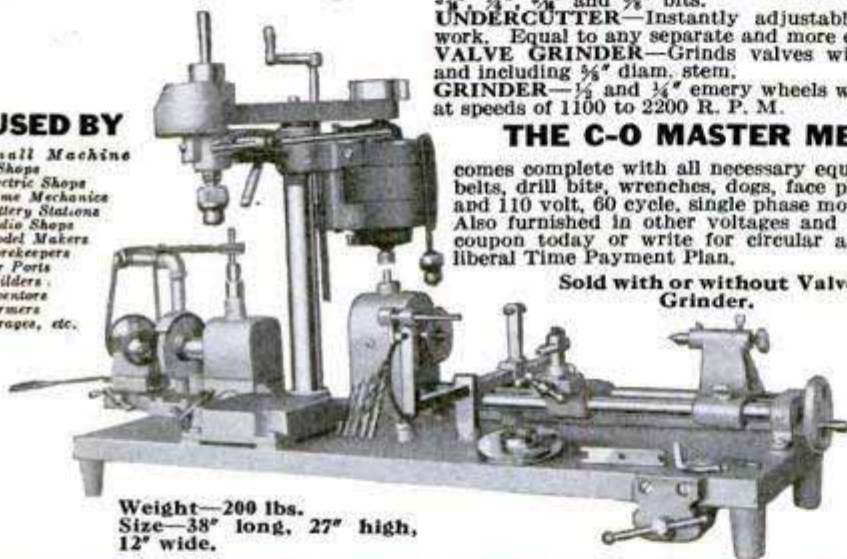
**VALVE GRINDER**—Grinds valves with 45 degrees up to and including  $\frac{5}{8}$ " diam. stem.

**GRINDER**— $\frac{1}{2}$ " and  $\frac{3}{4}$ " emery wheels with guards. Operates at speeds of 1100 to 2200 R. P. M.

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Small Machine Shops  
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Weight—200 lbs.  
Size—38" long, 27" high,  
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### THE C-O MASTER MECHANIC

comes complete with all necessary equipment, including belts, drill bits, wrenches, dogs, face plates, a small vise and 110 volt, 60 cycle, single phase motor, ready for use. Also furnished in other voltages and cycles. Send the coupon today or write for circular and details of our liberal Time Payment Plan.

Sold with or without Valve Grinder.

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Chicago Heights, Ill.

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Please send Free circular about the C-O Master Mechanic and your Liberal Payment Plan.

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Over 3 ft. long; in 5 sections; brass bound; powerful lenses. See distant objects. Loads of fun! Carrying Case FREE. **Send No Money** Postpaid only \$1.95 or C. O. D. plus postage. Satisfaction guaranteed or money back. **Ferry & Co., Dept. 9774, Chicago**



GOODWIN MFG. CO.

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complete as shown. 7 in. swing, 36 in. metal bed, 3 speed cone pulley. Longer bed \$1.00 per additional foot. **435 Keota St. Ottumwa, Iowa**

The man who studies gets ahead. Popular Mechanics Press will advise you what books to read to advance in your trade. 200 East Ontario Street, Chicago, Illinois.

## Fastest, Finest Outboard Motor for Runabouts, Cruisers, Racers



Hi-Speed Quad  
Price, \$325

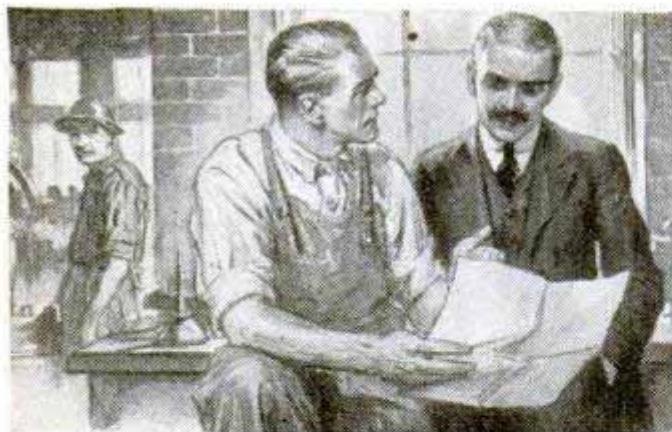
Service Quad  
Price, \$295

**ENJOY** big-boat pleasures at a fraction of old-time costs. Snappy runabouts; roomy, seaworthy cabin cruisers give surpassing speed and dependability when equipped with the great 4-cylinder Super Elto Quad. The last word in outboard motor engineering. New 1929 model far faster, 60% more powerful than last year's model, official world champion. Send for complete catalog of Super Elto motors. **Elto Outboard Motor Co., Ole Evinrude, President, Mason St., Dept. A2, Milwaukee.**

The **Mighty**  
**4-Cylinder**  
**Super Elto**  
**Quad**







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"Soon after I began studying," a student wrote to us the other day, "we had a change in management at our plant. I certainly was glad then that I had decided to study in my spare time. For, thanks to my I. C. S. course, I was the only man in the organization who could talk to the Superintendent in his own language. As a result, I was promoted over men who had been here from ten to twenty years. My salary has been increased 90% in the last ten months."

That's a true story of what just one I. C. S. student has done. There are thousands of others. Every mail brings letters from men and women telling of promotions and increases in salary due directly to spare-time study.

One hour a day, spent with the I. C. S. in the quiet of your own home, will prepare you for success in the work you like best. Yes, it will! Put it up to us to prove it.

Mail this Coupon for Free Booklet

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Without cost or obligation, please send me a copy of your booklet, "Who Wins and Why," and full particulars about the course before which I have marked X in the list below:

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| <input type="checkbox"/> C. P. A. Coaching                       | <input type="checkbox"/> Railway Mail Clerk           |
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| <input type="checkbox"/> Building Foreman        | <input type="checkbox"/> Plumber and Steam Fitter                           |
| <input type="checkbox"/> Concrete Builder        | <input type="checkbox"/> Plumbing Inspector                                 |
| <input type="checkbox"/> Contractor and Builder  | <input type="checkbox"/> Foreman Plumber                                    |
| <input type="checkbox"/> Structural Draftsman    | <input type="checkbox"/> Heating and Ventilation                            |
| <input type="checkbox"/> Structural Engineer     | <input type="checkbox"/> Sheet-Metal Worker                                 |
| <input type="checkbox"/> Electrical Engineer     | <input type="checkbox"/> Steam Engineer                                     |
| <input type="checkbox"/> Electrical Contractor   | <input type="checkbox"/> Marine Engineer                                    |
| <input type="checkbox"/> Electric Wiring         | <input type="checkbox"/> Refrigeration Engineer                             |
| <input type="checkbox"/> Electric Lighting       | <input type="checkbox"/> R. R. Positions                                    |
| <input type="checkbox"/> Electric Car Running    | <input type="checkbox"/> Highway Engineer                                   |
| <input type="checkbox"/> Telegraph Engineer      | <input type="checkbox"/> Chemistry  |
| <input type="checkbox"/> Telephone Work          | <input type="checkbox"/> Pharmacy   |
| <input type="checkbox"/> Mechanical Engineer     | <input type="checkbox"/> Mining Engineer                                    |
| <input type="checkbox"/> Mechanical Draftsman    | <input type="checkbox"/> Navigation <input type="checkbox"/> Assayer        |
| <input type="checkbox"/> Machine Shop Practice   | <input type="checkbox"/> Iron and Steel Worker                              |
| <input type="checkbox"/> Toolmaker               | <input type="checkbox"/> Textile Overseer or Supt.                          |
| <input type="checkbox"/> Patternmaker            | <input type="checkbox"/> Cotton Manufacturing                               |
| <input type="checkbox"/> Civil Engineer          | <input type="checkbox"/> Woolen Manufacturing                               |
| <input type="checkbox"/> Surveying and Mapping   | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Bridge Engineer         | <input type="checkbox"/> Poultry Farming                                    |
| <input type="checkbox"/> Gas Engine Operating    | <input type="checkbox"/> Mathematics <input type="checkbox"/> Radio         |

Name.....

Address.....

City..... State.....

Occupation.....

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

## Factories are Amazed at Remarkable Savings with INVINCIBLE Vacuum Cleaners

Portable

They clean everything in any plant—floors, walls, ceilings, machinery, motors, stock bins and your manufactured products. Made in various types for different requirements. Special cleaning tool for every purpose. NOT FOR HOME USE.



### Powerful Suction Gets All the Dirt

Suction is tremendous. Dirt removed from anywhere. They even save cost of repainting walls. Made for 21 years and first models still in use. Performance reports from factories everywhere show marvelous cost savings.

Plants reduce costs \$500 to \$4000 for every Machine Operated

Describe your cleaning problem. We will show you with facts, figures and illustrations how Invincibles have solved the same problems for others.

WRITE US TODAY!

**INVINCIBLE**  
Vacuum Cleaner Mfg. Co.  
148 Goshen St. DOVER, OHIO

SHOW  
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TO YOUR  
EMPLOYER

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### AN AMAZING NEW VENDING MACHINE 1600% PROFIT FOR MERCHANT

ASTOUNDING! Yes, but those are only a few of the reasons why dealers everywhere are eagerly installing this money making trade-stimulator. Be one of the lucky ones to get in on the ground floor with the fastest selling vending machine to be had. You need no experience. Don't wait. Send for full particulars of this big money making proposition today. **ACME PRODUCTS COMPANY**  
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Be an expert Morse or Continental code operator! BIG PAY—TRAVEL—FUN—ADVENTURE. After a few short weeks of practical study with Teleplex you will be an expert operator. This amazing instrument teaches you right in your own home. Works like a phonograph. No knowledge needed—beginners learn at once! Not a school. Free 10 days trial. Write for free booklet D-10. **TELEPLEX COMPANY, 72 CORTLAND ST., NEW YORK CITY**



### NEED A BETTER GRIP ON MATHEMATICS?

SEND for a copy of "Mathematics for the Practical Man," only \$1.50. By common sense methods it removes the mystery and difficulties so that algebra and even calculus are made simple.

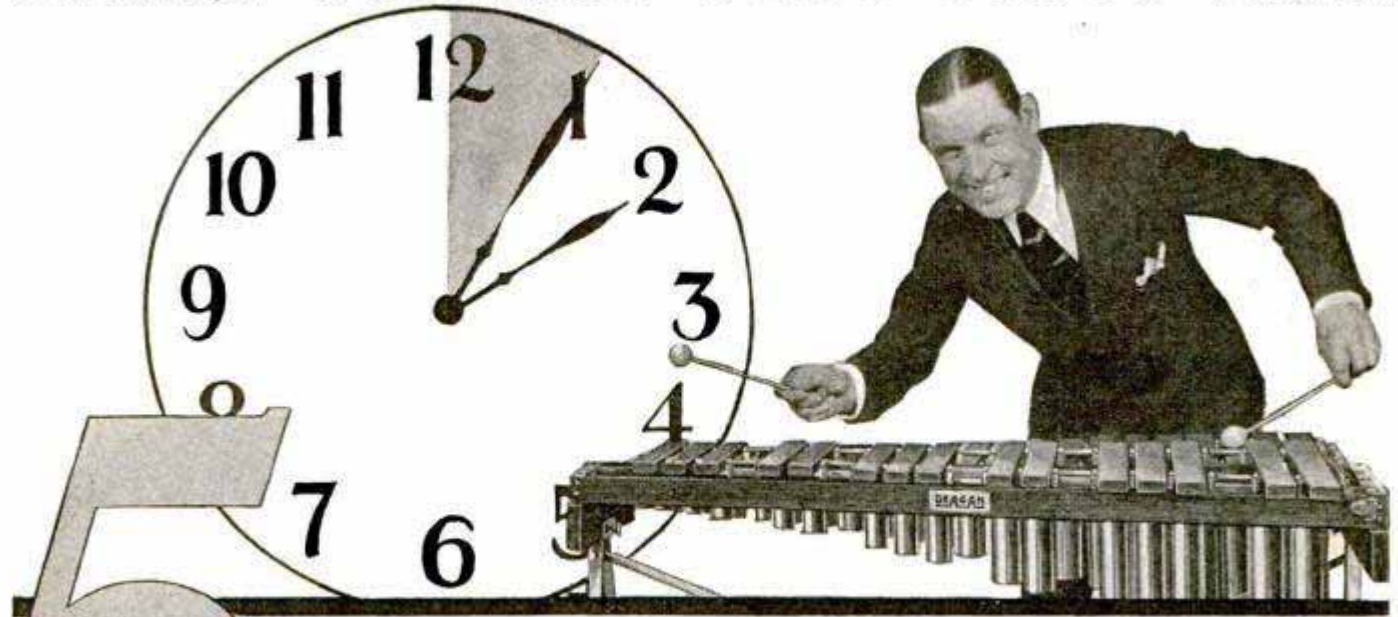
Assuming your knowledge is limited to arithmetic you quickly and easily gain a working knowledge of Algebra, Geometry, Trigonometry and Calculus. Simply pay postman price of book plus the postage when he hands you the package.

**Popular Mechanics Press**  
Room P9  
200 E. Ontario Street, Chicago





# START TO PLAY VERY FIRST DAY!



## 5 Minutes after I unpacked my Xylorimba I started playing!

**F**RANKLY, I was doubtful. I had always wanted to play some musical instrument. To be the center of interest at parties; to make \$5 to \$25 a night for work that is "play"; to know the joy of creating music—who isn't interested in these things?

But I had always dreaded the hours of exercise that most musical instruments require—"scale" practice in learning piano, finger exercises in learning violin, lip exercises in learning wind instruments. *It never occurred to me that the most spectacular of all instruments—the xylorimba—was also the EASIEST TO PLAY!*

### First Step Toward Musical Happiness

Then one day I saw an ad like this one, wrote for the big FREE book, selected the instrument I liked best and ordered it on a strict 5-day trial basis—and on such easy terms that I hardly noticed the payments.

*Five minutes after I unpacked my xylorimba, I was playing the notes of "Old Black Joe."*

It was a simple melody, to be sure—but it proved that I would actually be playing *real music* from the very start, without the tiresome finger or lip exercises. How much more pleasant, under these conditions, to take up the wonderfully simple lessons, one by one, and gradually learn to play more intricate selections! How much more pleasant, too, to learn in the privacy of your own home without a teacher. Never have I had such fun—such cheery evenings—such a feeling of

progress. The whole family have become xyloimba enthusiasts. Already, I am teaching my sweetheart to play. What a happy pupil she is!

### Friends Amazed!

Friends and relatives are amazed at my progress. To "dash off" a snappy fox-trot or dreamy waltz and then hear them shout for more, is a thrill that simply must be felt to be appreciated.

### BIG BOOK FREE!

How would you like to play the xylorimba—to have your presence demanded at gatherings—to make extra money playing at parties, dances, radio studios and perhaps even on the stage? Hundreds have

done it. You can, too, even if you can't read a note of music right now! On receipt of the coupon we will send our big FREE book telling all about the Deagan instruments—the easy payments—the delightfully simple free lessons. Five days' free trial in your own home—and a year to pay! No time like the present, no day like today, when fun and profit are involved. Send in the coupon NOW.

J. C. Deagan, Inc., Dept. 1454, 1770 Berteau Av., Chicago  
Send me, without obligation, full details of Free Trial offer and easy-payment plan on the Deagan Xylorimba.

Name \_\_\_\_\_

Address \_\_\_\_\_



# Say Fellows!

Let me tell you in my big Free book how I can quickly train you for jobs leading to salaries of \$60.00 to \$200.00 a week. **NOT BY CORRESPONDENCE. NOT BY BOOKS.** But, I'll train you in 90 days on real electrical equipment. You don't need advanced education or previous electrical experience. If you're short of money you can **earn while learning.** After you graduate I'll give you free employment service for life and as often as you want it. To all those enrolling now I'll include my big **New Aviation Course** as well as my **Radio and Auto Ignition** course.



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Mail the coupon today for your copy of this big Free book. It tells you an **amazingly easy way** to get into a big new field.

Sincerely

*H. C. Lewis*

**COYNE  
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500 S. Paulina St., Chicago

**FILL OUT - MAIL TODAY!**

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Dear Mr. Lewis: Without obligation send me your big free catalog and all details of Free Employment Service, Radio, Aviation and Automotive Electrical Courses and how many "earn while learning."

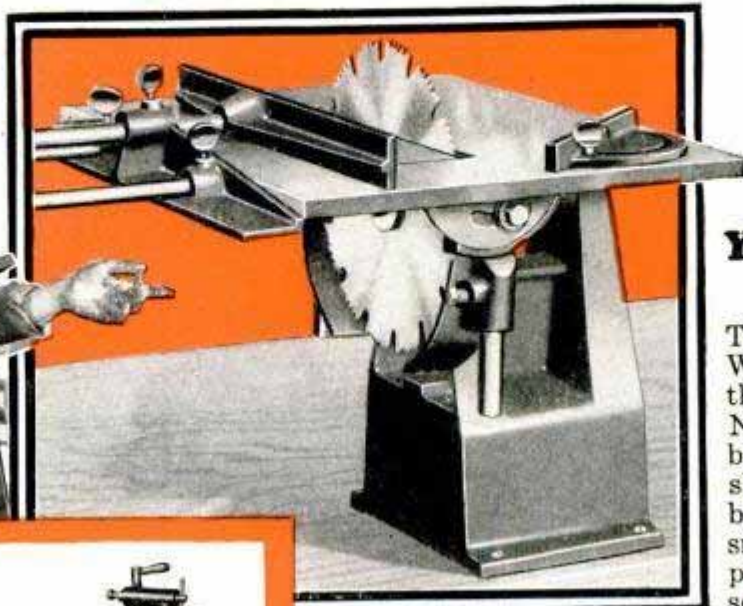
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# Now—a home workshop that you can build!



## An Entirely New Idea—Your Shop to Fit YOUR Needs

The 1929 SpeedWay Home Workshop antiquates anything you have ever seen. Nothing like it has ever been offered—a *unitized* shop—one that you can buy complete or, starting small, can build up part by part. No need to buy accessories you do not want! And the new SpeedWay starts with the most used tool of the home craftsman—a

**1.** The new SpeedWay Add-A-Part Home Workshop starts logically with the tool most used by home craftsmen—a rugged, heavy duty saw table.

rugged, heavy duty saw table that in itself sets a new standard.

## Add the Unit You Want

As your shop progresses, you can now add just the part you need. Your rugged SpeedWay becomes a planer, a sander, a jig saw, a grinder, a buffer—or any device within the range of home workshop requirements—by merely buying whichever part you select. YOU decide what *your* shop shall be, building it as you go.

## Patterned After Industrial Shops

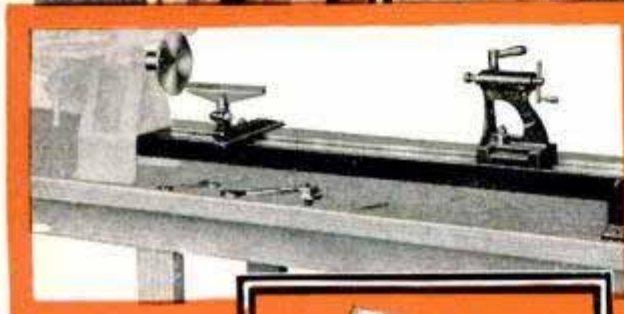
The 1929 SpeedWay Add-A-Part Shop is nothing less than a cabinet factory reduced in size to fit YOUR workshop. Imagine the finest workshop in the land,

patterned after equipment used in the world's best tooled factories.

## 10 Days FREE Trial

Inspect this shop before you buy. Write for catalog first—then, if you wish, present this catalog to your nearest distributor as evidence of your sincere interest and he will give you a half hour demonstration or, better still, he will let you work it yourself. You can even take it home for a ten day trial. If no distributor is nearby you may order direct from the factory with the same liberal terms and free trial.

## USE THIS COUPON



**2.** Note the simplicity with which this powerful sawtable is converted into a wood turning lathe of generous capacity and lasting construction.



**3.** See how, "Step-by-Step," you can build a complete workshop. Here is a sturdy addition for planing and joining—adjustable to the finest limitations.



**4.** The immense popularity of the 1929 SpeedWay lies in the fact that you can Pick-Your-Own Shop Parts. This Sanding Table and Disk is one of seven units you add as needed.

## Half Hour Demonstration FREE to Holders of SpeedWay Catalog

Write for your catalog first; then present it to any one of the distributors shown below. You will be given a half hour demonstration FREE.

Electrical Specialty Co.,  
449 S. San Pedro St.,  
Los Angeles, California

D. N. Carlin Co.,  
606 Highland Bldg.,  
Pittsburgh, Pennsylvania

Mechanics Supply Co.,  
904 E. Pike St.,  
Seattle, Washington

Eggleston Supply Co.,  
259 Franklin St.,  
Boston, Massachusetts

Gladfelter Elec. Tool Sales,  
2511 Grand River Ave.,  
Detroit, Michigan

E. C. Hammett & Co.,  
1811 Callowhill St.,  
Philadelphia, Pennsylvania

Hirsch Tool Company,  
86 E. Michigan St.,  
Milwaukee, Wisconsin

Mohr Bros. Company,  
116 E. Ninth St.,  
San Francisco, California

Electro Magnetic Tool Co.,  
(Factory Branch)  
5 Great Jones St.,  
New York City

Arthur E. Bacon & Co.,  
912 - 20th St.,  
Denver, Colorado

A. C. Lewis, Ltd.,  
19 Glenview Ave., Toronto

Electro Magnetic Tool Co.,  
(Factory)  
19th & 52nd Ave., Chicago

## Send Now for Free Catalog

ELECTRO MAGNETIC TOOL CO.,  
Dept. S, 1832 S. 52nd Ave., Chicago, Ill.  
Gentlemen:

Please send me FREE catalog on the 1929 SpeedWay Home Workshop—the truly modern shop that can be built up one unit at a time.

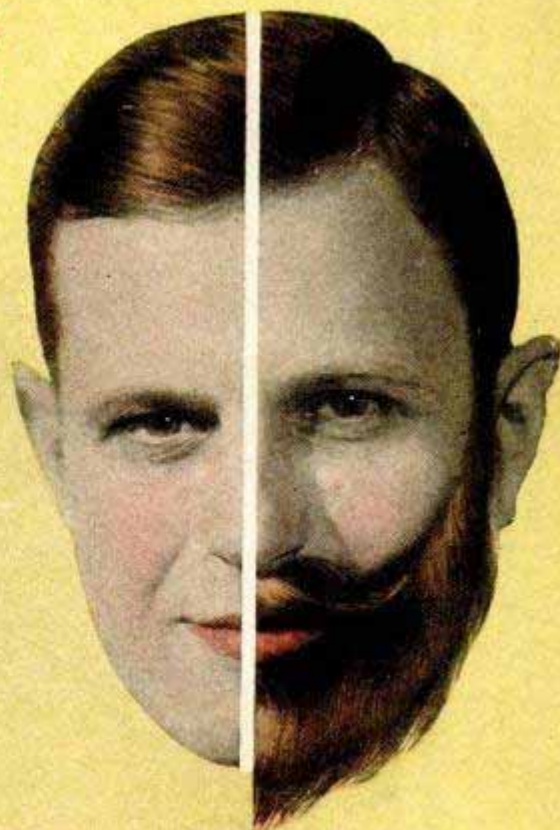
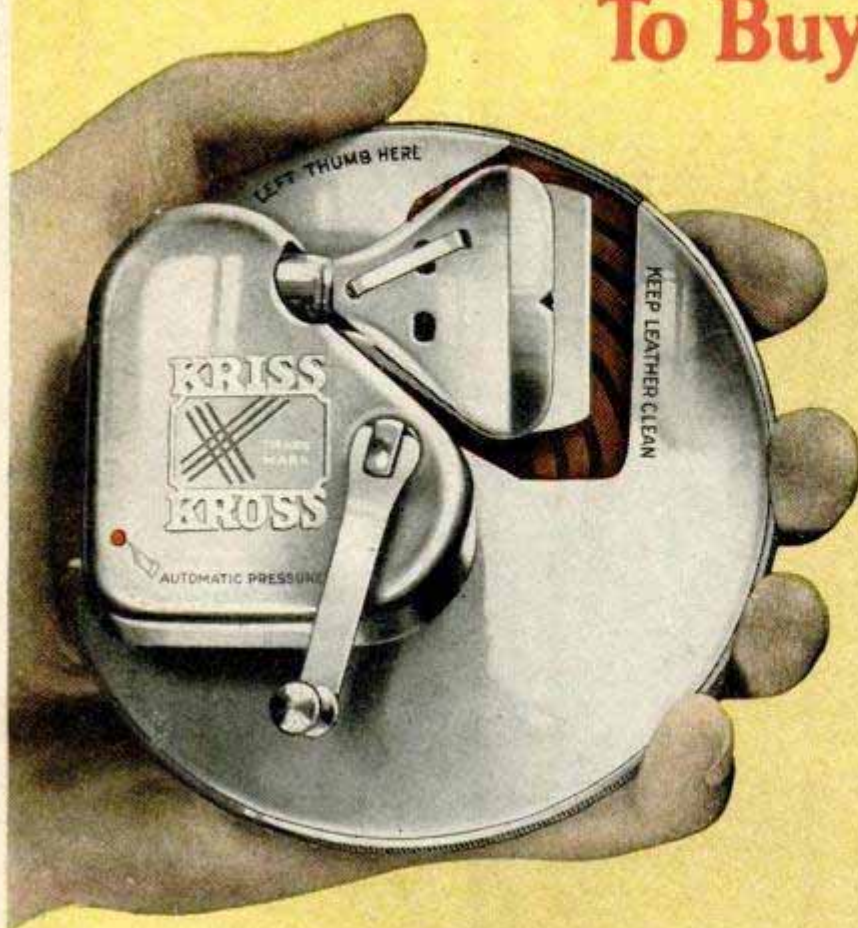
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City..... State.....



# No More Razor Blades To Buy!



## 365 KEEN SHAVES

### A Year With One Single Blade

"I want to say that KRISS-KROSS Stropper is the best thing I ever saw. I have been using one blade continuously for one year and nine months and have no idea how much longer it will last."

C. S. Stephenson, Okla.

# Inventor Discovers Amazing New Way to Shave! —Without Buying Blades!

**K** EEN, velvety shaves forever and no more blades to buy! That's what this astonishing invention offers the great army of American shavers today!

KRISS-KROSS is destined to revolutionize all existing traditions of shaving! Its performance is so sensational that it seems hardly fair to call it a stropper. Rather it is a *super-stropper* or blade-rejuvenator! No longer do you find that your blades "die" after five or six shaves. KRISS-KROSS "brings 'em to life" a surprising way! Actually—you can take a blade right out of a fresh package and improve it as much as 100% in eleven seconds with KRISS-KROSS.

## MAGIC DIAGONAL STROKE

KRISS-KROSS employs the famous *diagonal stroke*, same as a master barber uses. Never before has anyone captured the secret of reproducing it automatically. Eight "lucky leather grooves" do the trick in 11 seconds with a precision it takes a master barber years to attain. Stropps from *heavy to light*. Adjustable, automatic jig flies up and notifies you that your blade is ready—ready with the *keenest cutting-edge that steel can take!*

KRISS-KROSS produces unbelievable sharpness and prolongs the life of any razor blade for months and even years. Fits all brands and makes except Durham. Eliminates 83% of shaving costs and solves your blade problem for all time!

## SENSATIONAL OFFER

And now for my surprising offer. To introduce KRISS-KROSS, I am giving with it Free a new kind of razor. Possesses remarkable features. Instantly adjustable to any shaving position. A flip of

the finger makes it (1) T-Shape; (2) straight (old style); (3) or diagonal (new way). Also adjustable for *light, medium or heavy* shaves. Gives a *sliding* instead of *pulling* stroke. Simply zips right through the toughest crop of whiskers. Made of *rustless* metal. Comes with 5 special-process blades and is entirely unlike anything you ever saw before!

## GET FREE OFFER

Send for full information on these surprising new inventions today. KRISS-KROSS products are never sold in stores. You deal direct with me or my authorized representative. Write for illustrated description and full details of free razor offer. It's even more remarkable than I can tell you in this short space. Clip the coupon now. Mail it today.

## Agents \$30 a Day and Up

Make big money with KRISS-KROSS. Giving away FREE razors boosts your profits amazingly. H. King made \$66 in one day. N. C. Paige made \$104 in 3 days! Others average \$350 and up to \$750 a month! *Spare-time* workers, *Office* and *Factory* men make \$6-\$12 extra a day, showing KRISS-KROSS to friends and fellow employees. S. Kantala made \$154 extra just working evenings 3 weeks. Get details at once. Check bottom of coupon and mail it tonight!

RHODES KRISS-KROSS CORP., Dept. D-373,  
1418 Pendleton Ave., St. Louis, Mo.

Without obligation, please send me illustrated description and full details of your special introductory offer on KRISS-KROSS super-stropper and FREE 3-way razor.

Name.....

Address.....

Town.....State.....

( ) Check here if interested in making money as authorized KRISS-KROSS representative.

Rhodes

**KRISS KROSS**

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Canadian Address: CANADIAN KRISS-KROSS CO. **STROPPER**